SAN FRANCISCO PUBLIC LIBRARY
3 1223 03273 8321

5/S

San Francisco Public Library

Government Information Center
San Francisco Public Library
100 Larkin Street, 5th Floor
San Francisco, CA 94102

REFERENCE BOOK

Not to be taken from the Library

Digitized by the Internet Archive
in 2016 with funding from
San Francisco Public Library

https://archive.org/details/expenditureplans2003dyet

SAN FRANCISCO COUNTY TRANSPORTATION AUTHORITY

EXPENDITURE PLAN AND SALES TAX REAUTHORIZATION
DRAFT ENVIRONMENTAL IMPACT REPORT

JUNE 2003

State Clearinghouse No. 2003052035

3 1223 03273 8321

NOTICE OF COMPLETION

DRAFT ENVIRONMENTAL IMPACT REPORT (EIR)

SAN FRANCISCO COUNTY TRANSPORTATION AUTHORITY: EXPENDITURE PLAN AND SALES TAX REAUTHORIZATION

Date: June 18, 2003

To: Responsible Agencies, Interested Parties, and Organizations

From: Tilly Chang – Manager of Planning

Subject: **Notice of Completion of an Environmental Impact Report (EIR) for the San Francisco County Transportation Authority Proposed Expenditure Plan and Sales Tax Reauthorization (SCH# 2003052035)**

The San Francisco County Transportation Authority (Authority) has prepared an Expenditure Plan for the reauthorization of the half-cent sales tax for transportation in San Francisco, and developed a programmatic Draft Environmental Impact Report (EIR) for the New Expenditure Plan to guide sales tax investments. A brief project description is provided on the following pages.

The public review period for the Draft EIR will extend from June 18, 2003 through July 17, 2003. Your views and comments are welcomed. Contact information at SFCTA is listed below.

4 50399 SFPL: ECONO JRS
153 SFPL 11/21/03 58

NOTICE OF COMPLETION

DRAFT ENVIRONMENTAL IMPACT REPORT (EIR)

SAN FRANCISCO COUNTY TRANSPORTATION AUTHORITY: EXPENDITURE PLAN AND SALES TAX REAUTHORIZATION

1. PROJECT TITLE:

   San Francisco County Transportation Authority: Expenditure Plan and Sales Tax Reauthorization
   SCH# 2003052035

2. LEAD AGENCY NAME AND ADDRESS:

   San Francisco County Transportation Authority
   100 Van Ness Avenue, 25th Floor
   San Francisco, CA 94102

3. CONTACT PERSON AND PHONE NUMBER:

   Tilly Chang, Manager of Planning
   San Francisco County Transportation Authority
   P: (415) 522-4832
   F: (415) 522-4829
   Tilly_Chang@sfcta.org

4. PROJECT SPONSOR'S NAME AND ADDRESS:

   San Francisco County Transportation Authority
   100 Van Ness Avenue, 25th Floor
   San Francisco, CA 94102

5. PROJECT LOCATION:

   The SFCTA is the transportation planning and programming agency for the City/County of San Francisco. San Francisco is the only jurisdiction in California where the City and County governances share the same physical boundary. The City is located at the northern end of the San Francisco Peninsula and forms the southern portion of the mouth to San Francisco Bay. The City's 46.7 square miles are bordered by the Pacific Ocean to the west, the San Francisco Bay to the north and east, and the cities of Daly City and Brisbane to the south.

6. DOCUMENT TYPE:

   Draft Environmental Impact Report

7. DEVELOPMENT TYPE:

Various transportation projects and programs.

8. PROJECT ISSUES DISCUSSED IN DOCUMENT:

Transportation
Air Quality
Biological Resources
Cultural Resources
Energy
Geology and Seismicity
Hazardous Materials
Noise
Visual Resource
Water Resources

9. GENERAL PLAN DESIGNATION:

Per City and County of San Francisco General Plan.

10. ZONING:

Per City and County of San Francisco Zoning Ordinance.

11. DESCRIPTION OF PROJECT:

EXPENDITURE PLAN AND SALES TAX REAUTHORIZATION

In November 1989, San Francisco voters approved Proposition B, a half-cent sales tax to fund transportation improvements according to a 20-year Expenditure Plan. In the 14 years since the program's inception, Proposition B sales tax revenues have funded over $760 million in transportation improvements throughout the city.

While the sales tax authorized by Proposition B does not sunset until 2010, there are compelling reasons to adopt a New Expenditure Plan and continue the tax to fund the improvements proposed in the new plan. All the major capital projects envisioned in the Prop B Expenditure Plan either have already been delivered or are currently being delivered. This includes the Embarcadero Roadway, the F-Line of Historic Streetcars, the 3rd Street Light Rail Line, the renovation of the entire MUNI bus, trolleybus and streetcar fleet, and a number of other major capital improvements. San Francisco's ability to deliver a new crop of major capital projects depends on its success in capturing discretionary federal and state dollars, but those dollars require local matching funds. The reauthorization is the logical source of those matching funds for capital projects. Prop B included a number of "programmatic" categories, such as funding for the paratransit program or for operations and maintenance of the F-Line. A number of these categories have been tremendously successful, and as a result have required larger ongoing funding levels than those originally anticipated in Prop B. Reauthorization of Prop B can provide an answer to the long term financial viability of these programmatic categories. Finally, in the past 14 years the city's needs have evolved and the transportation profession has come up with whole classes of projects and techniques, such as traffic calming, that were not part of the transportation planners' armamentarium back in 1989, when the original Prop B was approved. A reauthorized Prop B provides an opportunity to adopt a New Expenditure Plan that devotes sufficient funds to these new categories.

The Authority therefore seeks to adopt a New Expenditure Plan and extend the existing tax to provide the revenues necessary to implement the New Plan. This combined action will be referred to in this document as "the Proposition". The Proposition would provide sales tax funding for transportation projects over the next 30 years, starting April 1, 2004. The existing local transportation sales tax rate of one-half of one percent would not change. The Authority will present the Proposition to voters on the November 2003 ballot.

11. DESCRIPTION OF PROJECT:

EXPENDITURE PLAN AND SALES TAX REAUTHORIZATION

The projects and programs included in the Proposition are designed to improve San Francisco's transportation system over the next 30 years and are intended to help implement the long-range vision for development of the City's transportation system, as articulated in the San Francisco Countywide Transportation Plan.

The major objectives of the Countywide Transportation Plan are to enhance mobility and accessibility throughout the city, improve safety for all transportation system users, support the city's economic development and the vitality of neighborhoods, sustain environmental quality, and promote equity and efficiency in transportation investments. The Expenditure Plan sets forth a set of specific projects and programs that include planning, maintenance and rehabilitation, and improvements to the city's multi-modal transportation system.

12. REVIEWING AGENCIES:

- Metropolitan Transportation Commission
- Bay Area Air Quality Management District
- Association of Bay Area Governments

13. PUBLIC REVIEW PERIOD:

June 18 to July 17, 2003

14. PUBLIC MEETING:

July 9th, 6pm-8pm

San Francisco County Transportation Authority
100 Van Ness Avenue, 3rd Floor Conference Room

15. CONSULTING FIRM:

Dyett & Bhatia Urban, and Regional Planners
755 Sansome Street, Suite 400
San Francisco, CA 94111

EXPENDITURE PLAN AND SALES TAX REAUTHORIZATION

DRAFT ENVIRONMENTAL IMPACT REPORT

STATE CLEARINGHOUSE NO. 2003052035

DOCUMENTS DEPT
JUN 2 4 2003
SAN FRANCISCO
PUBLIC LIBRARY

Prepared for

San Francisco County Transportation Authority

by

DYETT & BHATIA
Urban and Regional Planners

In association with

Environmental Science Associates • *Environmental Consultants*
DKS Associates • *Transportation Consultants*

June 2003

TABLE OF CONTENTS

Executive Summary **S-1**

1 Introduction **1-1**

1.1: Overview 1-1
1.2: Purpose and Need 1-2
1.3: Agency Use of the Document 1-3
1.4: Public Concerns and Involvement 1-4
1.5: Scope of Analysis and Documentation 1-5
1.6: Organization of Draft EIR 1-7

2 Project Description **2-1**

2.1: Introduction and Background 2-1
2.2: Description of Proposed Action 2-3

3 Environmental Setting and Impacts **3-1**

3.1: Introduction and Assumptions 3-1
3.2: Transportation 3-3
3.3: Air Quality 3-23
3.4: Biological Resources 3-45
3.5: Cultural Resources 3-80
3.6: Energy 3-89
3.7: Geology and Seismicity 3-102
3.8: Hazardous Materials 3-124
3.9: Noise 3-136
3.10: Visual Resources 3-154
3.11: Water Resources 3-161

4 Project Alternatives 4-1

4.1: Description of Alternatives 4-1
4.2: Comparison of Alternatives – Impacts 4-4
4.3: Environmentally Superior Alternative 4-13

5 CEQA Findings 5-1

5.1: Growth-Inducing Impacts 5-1
5.2: Significant Unavoidable Impacts 5-4
5.3: Significant Irreversable Environmental Changes 5-4
5.4: Cumulative Impacts 5-7
5.5: Impacts Found Not to be Significant 5-10

6 Report Authors 6-1

7 References 8-1

Appendices:

A: Notice of Preparation A-1
B: Table: Comparison of Expenditure Plan and Alternatives B-1

LIST OF FIGURES

Figure 2-1: Regional Location 2-4
Figure 2-2: Expenditure Plan Project Locations 2-9

Figure 3.2-1: 2000 Transit Volume/Capacity, PM Peak Period 3-8
Figure 3.2-2: Change in Jobs 2000 – 2025 3-12
Figure 3.2-3: Change in Population 2000 – 2025 3-13
Figure 3.2-4: Changed in Employed Residents 2000 – 2025 3-14
Figure 3.2-5: Expenditure Plan Transit Screenlines, 2025 3–21
Figure 3.2-6: Future Baseline Screenlines, 2025 3-22

Figure 3.4: Sensitive Resource Areas. 3-48

Figure 3.7: Regional Fault Map 3-105
Figure 3.7: Liquefaction & Earthquake Induced Landslide Seismic Hazard Zones 3-112
Figure 3.7-3: 20-Foot Tsunami Run-Up Map 3-114
Figure 3.7-4: Areas Susceptible to Landslides 3-115

Figure 3.8-1: Potential to Encounter Hazardous Materials during Construction 3-125
Figure 3.10-1: Aerial View of Downtown San Francisco 3-154

Figure 3.11-1: San Francisco Water Bodies and Areas of Inundation due to reservoir Failure 3-167
Figure 4-1: One Cent Alternative Screenlines,2025 4-7
Figure 5.1: Proposed Citywide Land Use Action Plan 5-5
Figure 5.2: Proposed Transit Priority Network Action Plan 5-6

LIST OF CHARTS

Chart 2-1: Investment Priorities under the Proposed Expenditure Plan (Prop B Allocations) 2-7
Chart 5-1: Historic Trends and Growth Projections in San Francisco, 1980-2035 5-2

LIST OF TABLES

Table 2-1: SF Expenditure Plan Summary 2-5
Table 2-2: Proposed Expenditure Plan Projects and Programs 2-11
Table 3.2-1: San Francisco Resident Workers by Means of Transportation to Work, 1990 – 2000 3-3
Table 3.2-2: Estimated Commuting of San Francisco Residents, 1990 – 2000 3-4
Table 3.2-3: Estimated Commuting to San Francisco Jobs, 1990 – 2000 3-5
Table 3.2-4: Average Travel Time Comparison – Internal SF Trips Only 3-17
Table 3.2-5: Daily Vehicle Miles and Vehicle Hours Comparison – San Francisco Links 3-18
Table 3.2-7: Accessibility Comparisons – San Francisco Residents 3-19
Table 3.2-8: Transit Boardings 3-20

Table 3.3-1: Ambient Air Quality Standards and Bay Area Attainment Status 3-26
Table 3.3-2: Transportation Control Measures in the State Implementation Plan 3-29
Table 3.3-3: Proposed Transportation Control Measures in 2001 Ozone Attainment Plan 3-30
Table 3.3-4: Transportation Control Measures in the Clean Air Plan 3-31
Table 3.3-5: Summary of Monitoring Data for the Arkansas Street and Ellis Street Stations in San Francisco, 1998 – 2002 3-33
Table 3.3-6: Ozone Data Summaries for the San Francisco Bay Area Air Basin, 1991–2001 3-34

Table 3.3-7: Changes in Daily VMT Within San Francisco Associated with Expenditure Plan Projects 3-41
Table 3.3-8: Emissions Associated with Expenditure Plan Projects 3-43

Table 3.4-1: Focused List of Special-Status Species with Potential to Occur within the San Francisco Project Area 3-49
Table 3.5-1: Prehistoric and Historic Resources in San Francisco 3-83
Table 3.5-2: San Francisco Historic Districts 3-84
Table 3.5-3: San Francisco Conservation Areas 3-85

Table 3.6-1: Transportation Energy Consumption in California and the Bay Area (2000) 3-92
Table 3.6-2: Energy Factors of Transit Service 3-93
Table 3.6-3: Energy Factors for Commercial Vehicles 3-94
Table 3.6-4: Daily Energy Use by Private Vehicles 3-99
Table 3.6-5: Daily Energy Use by Transit, Billion BTU/day 3-100
Table 3.6-6: Daily Energy Use by Transportation Systems (BTUs in billions) 3-101
Table 3.7-1: Active Faults in the Vicinity of the City of San Francisco.. 3-106
Table 3.7-2: Modified Mercalli Intensity Scale 3-107
Table 3.7-3: Projects Susceptible to Strong Ground Shaking 3-119
Table 3.7-4: Projects Subject to Liquefaction 3-119

Table 3.9-1: Effects of Noise on People 3-137
Table 3.9-2: Reference Noise Levels for Various Rail Operations 3-140
Table 3.9-3: Typical Construction Phase Noise Levels 3-142
Table 3.9-4: Typical Noise Levels from Construction Equipment 3-142
Table 3.9-5: Land Use Compatibility Chart for Community Noise, DNL or CNEL in dBA 3-146
Table 3.9-6: Noise Impact Criteria - Effect on Cumulative Noise Exposure 3-148
Table 3.9-7: Projected Traffic Changes Along Key Arterial Corridors in San Francisco 3-150
Table 3.9-8: Projected Traffic Changes Along Key Freeways in San Francisco 3-152

Table 4-1: Average Travel Time Comparison – Internal SF Trips Only 4-4
Table 4-2: Daily Vehicle Miles and Vehicle Hours Comparison – San Francisco Links 4-5
Table 4-3: VMT and VMT LOS F Comparisons – San Francisco Links . 4-5
Table 4-4: Accessibility Comparisons – San Francisco Residents 4-6
Table 4-5: Transit Boardings 4-6
Table 4-6: Comparison of the No Project Alternative and the One Cent Sales Tax Alternative to the Expenditure Plan 4-8
Table 4-7: Alternatives, Compared to the Proposed Project 4-14

Table 5-1: Growth Trends in San Francisco, 1980-2000 5-1
Table 5-2: Growth Projections in San Francisco, 2000-2035 5-2

Executive Summary

This Program Environmental Impact Report (EIR) has been prepared on behalf of the San Francisco County Transportation Authority (SFCTA or Authority) in accordance with the California Environmental Quality Act (CEQA). It analyzes a proposed 30-year extension of the current half-cent sales tax for transportation in San Francisco (known as Prop B), and the New Expenditure Plan that would guide the use of funds generated by the sales tax. The Authority plans to place the sales tax measure on the November 2003 ballot. The proposed Sales Tax Reauthorization measure and the New Expenditure Plan constitute the "Proposed Project" for this EIR.

The New Expenditure Plan identifies a program of investments to be funded from the proposed sales tax. The projects and programs included are designed to improve San Francisco's transportation system over the next 30 years and are intended to help implement the long-range vision for development of the city's transportation system articulated in the San Francisco Countywide Transportation Plan (CWTP).

The major objectives of the CWTP are to enhance mobility and accessibility throughout the city, improve safety for all transportation system users, support the city's economic development and the vitality of neighborhoods, sustain environmental quality, and promote equity and efficiency in transportation investments. The Expenditure Plan's projects and programs include planning, maintenance and rehabilitation, and improvements to the city's multi-modal transportation system.

INTRODUCTION

Purpose of the Expenditure Plan EIR

In November 1989, San Francisco voters approved Proposition B, a half-cent sales tax to fund transportation improvements according to a 20-year Expenditure Plan. In the 14 years since the program's inception, Proposition B sales tax revenues have funded over $760 million in transportation improvements throughout the city.

While the sales tax authorized by Proposition B does not sunset until 2010, there are compelling reasons to adopt a New Expenditure Plan and continue the tax to fund the improvements proposed in the new plan. All the major capital projects envisioned in the Prop B Expenditure Plan either have already been delivered or are currently being delivered. This includes the Embarcadero Roadway, the F-Line of Historic Streetcars, the 3rd Street Light Rail Line, the renovation of the entire MUNI bus, trolleybus and streetcar fleet, and a number of other major capital improvements. San Francisco's ability to deliver a new crop of major capital projects depends on its success in capturing discretionary federal and state dollars, but those dollars require local matching funds. The reauthorization is the logical source of those matching funds for capital projects. Prop B included a number of "programmatic" categories, such as funding for the paratransit program or for operations and maintenance of the F-Line. A number of these categories have been tremendously successful, and as a result have required larger ongoing funding levels than those originally anticipated in Prop B. Reauthorization of Prop B can provide an answer to the long term financial viability of these programmatic categories. Finally, in the past 14 years the city's needs have evolved and the transportation profession has come up with whole classes of projects and techniques, such as traffic calming, that were not part of the transportation planners' armamentarium back in 1989, when the original Prop B was approved. A reauthorized Prop B provides an opportunity to adopt a New Expenditure Plan which devotes sufficient funds to these new categories.

The Authority therefore seeks to adopt a New Expenditure Plan and extend the existing tax to provide the revenues necessary to implement the New Plan. This combined action will be referred to in this document as "the Proposition". The Proposition would provide sales tax funding for transportation projects over the next 30 years, starting April 1, 2004. The existing local transportation sales tax rate of one-half of one percent would not change.

The purpose of this EIR is to inform decision-makers, responsible and trustee agencies, and the public of the environmental impacts of the Proposed Project and to meet the requirements of CEQA. Pursuant to the provisions of CEQA and related case law, agency-initiated ballot measures and adoption of the Expenditure Plan must include analyses of the potential significant environmental impacts associated with implementation of these actions. This is an informational document, not a decision document.

The Program EIR contains an analysis of the proposed Project and all potential environmental impacts expected to result from implementation of the various transportation improvement programs and projects identified, as well as mitigation measures that could avoid or minimize the significant environmental impacts identified. In accordance with CEQA requirements, it also identifies and evaluates alternatives to the proposed New Expenditure Plan. Responses to the comments submitted during the 30-day public review of this Draft EIR will be compiled into the Final EIR. The Final EIR will be subject to certification by the Authority, prior to adoption of the New Expenditure Plan and placement of the Proposition on the November ballot.

Scope of Analysis and Documentation

Because of the programmatic nature of the New Expenditure Plan, this EIR has been prepared as a Program EIR. A Program EIR can be used as the basic, general environmental assessment for an overall program of projects developed over the 30 year planning horizon. It allows the lead agency to look at the broad, regional impacts of a program of actions before its adoption and eliminates redundant or contradictory approaches to the consideration of regional and cumulative impacts.

This document focuses on the overall citywide effects of the sales tax measure and Expenditure Plan in the Planning Area; the analysis does not examine the effects of site-specific projects that may occur under the umbrella of this Plan in the future. This Program EIR will not obviate the need for environmental review of individual transportation projects subsequent to the adoption of the New Expenditure Plan.

Public Concerns and Involvement

Public participation was generated for this environmental assessment of the proposed Project primarily through issuance of a Notice of Preparation. Additionally, several public workshops have been held and a public hearing will be held by the Authority's Board of Commissioners to discuss the adequacy of the Draft EIR. If the Authority Board certifies the Final EIR and so authorizes, a ballot measure will be put to San Francisco's voters on the November 2003 ballot.

Public outreach for the New Expenditure Plan is guided by the three-tiered strategy that includes: 1) policy steering committees, 2) technical working groups, and 3) community workshops and other opportunities for public input. These activities, together with extensive use of the Authority's website (www.sfcta.org) to disseminate information, are designed to ensure broad and inclusive public participation in the planning process.

Regional Location and Study Area

The Authority determines transportation priorities and projects throughout the City/County of San Francisco. The city is located at the northern end of the San Francisco Peninsula and forms the southern portion of the entrance to San Francisco Bay. The city's 46.7 square miles are bordered by the Pacific Ocean to the west, San Francisco Bay to the north and east, and the cities of Daly City and Brisbane to the south.

REPORT ORGANIZATION

This EIR document is organized into four parts, as outlined below. This executive summary outlines the Project, describes the alternatives and their merits, and evaluates the environmentally superior alternative.

Part One: Introduction and Project Description

Part One includes two chapters. Chapter 1 describes the relationship between the proposed Project and the EIR and describes the basic legal requirements of a program level EIR. It discusses the level of analysis involved, public participation, and agency uses for the document. Chapter 2 introduces the context, purpose, and objectives of the New Expenditure Plan. It includes a summary of the Plan, a discussion of investment priorities, and a description of each project and program included in the Plan.

Part Two: Setting, Impacts, and Mitigation Measures

Part Two, which consists of Chapter 3: Environmental Setting and Impacts, describes the existing environmental setting for each of the environmental impact areas analyzed in the EIR, the potential impacts that the proposed Expenditure Plan would have on these areas, and measures to mitigate the potential impacts identified. Each impact area is analyzed separately. The chapter is organized as follows:

- Introduction;
- Transportation;
- Air Quality;
- Biological Resources;
- Cultural Resources;
- Energy;
- Geology and Seismicity;
- Hazardous Materials;
- Noise;
- Visual Resources; and
- Water Resources.

Part Three: Alternatives and CEQA-Required Conclusions

Part Three, which includes chapters 4 and 5, includes a description and comparison of transportation alternatives. Key features of each are presented, and potential impacts are discussed and compared to the proposed Expenditure Plan. Part Three discusses impacts that implementation of the alternatives would have for each of the environmental impact areas presented in Part Two. As required by CEQA, an environmentally superior alternative is identified.

Part Four: Appendices

Part Four includes the EIR appendices. Appendix A includes the Notice of Preparation (NOP) of this EIR and Appendix B contains a table comparing the Expenditure Plan and the Alternatives.

PROJECT AND ALTERNATIVES

The EIR evaluates the impacts of the proposed Expenditure Plan and two alternatives. A summary of the Expenditure Plan is included in Chapter 2, and a full description of the alternatives in Chapter 4. The alternatives are as follows:

- **No Project Alternative.** Consideration of the No Project Alternative is required by CEQA in all EIRs. Some of the new projects have already been funded, regardless of the proposed Expenditure Plan, and are thus included as part of this alternative. The No Project Alternative represents the minimum program of investments; it is consistent with San Francisco's committed program in the 2001 MTC Regional Transportation Plan.

- **One Cent Transportation Sales Tax Alternative.** The One Cent Transportation Sales Tax Alternative considered the additional transportation improvement projects that would be funded if the Expenditure Plan were based on revenues from a one-cent sales tax, rather than the half-cent sales tax proposed in the Project. This alternative would fund additional transportation programs and projects, beyond those identified in the proposed Expenditure Plan. The intent of this alternative was to further improve the transportation system and reduce potential impacts of the proposed Expenditure Plan.
- **Expenditure Plan.** The primary objective of the Expenditure Plan is to implement the goals of the CWTP through investment in a set of projects and programs that encompass planning, maintaining, and improving the city's multi-modal transportation system. The proposed Proposition has a structure similar to the existing Expenditure Plan, with four main categories of projects and programs: Transit, Paratransit, Streets and Traffic Safety, and Transportation System Management/Strategic Initiatives, although some sub-categories are organized differently (e.g. Bicycle and Pedestrian projects are proposed to be included under Streets and Roads instead of Transportation System Management) and new sub-categories are proposed (e.g. Traffic Calming). Major investment categories include transit, streets and traffic safety, and paratransit.

  Highlights of the proposed Plan include:

  - Transit funds are allocated to MUNI, the local transit operator, as well as to regional operators that serve San Francisco such as BART, Caltrain, and ferries. The majority of the transit funds, however, are proposed for MUNI. In general, transit investment is targeted to network improvements such as system connectivity and reliability. The existing commitment to paratransit is also maintained.
  - Funds are allocated to four proposed major capital projects: the Central Subway; extension of Caltrain to a rebuilt Transbay Terminal; a rapid bus network, including dedicated transit facilities on two key corridors; and the reconstruction of Doyle Drive (the access to the Golden Gate Bridge through the Presidio), to enable seismic and safety improvements as well as multi-modal access between the Marina and Presidio. These committed projects leverage sizable amounts of federal, state and regional funding and, with the exception of the rapid bus network, have their own environmental documentation either completed or substantially completed already.
  - The Streets and Traffic Safety category now includes pedestrian and bicycle projects. In the current Proposition B Expenditure Plan, these projects are included in the Transportation System Management (TSM) category, which is only 2 percent of the total Expenditure Plan. In the proposed Expenditure Plan, funds for bicycle and pedestrian projects have been increased significantly, and they are placed in Streets and Traffic Safety because they are part of an effort to make better use of the entire street right of way, from property line to property line, which is shared by all modes of transportation, including cars, buses, bicycles and pedestrians.

- The Plan takes responsibility for ensuring funding for the local share of deferred transit and roadway maintenance. In order to capture approximately $7 billion in regional, State and federal funds for transit maintenance, the plan must put in place $1.3 billion in local matching funds. This is a very significant number (about half of the total revenues expected from the reauthorized tax), but it is unavoidable if the City wants to maintain the current system and avoid much larger rehabilitation costs, which would occur if regular maintenance were not performed.

- The Plan creates a new sub-category under Streets and Traffic Safety for traffic calming projects around the city. These projects respond to the growing clamor from neighborhoods to provide an answer to the street safety problems caused by increased cut through traffic in the neighborhoods and related issues. Approximately $4 million per year would be made available to install speed humps, chicanes (narrowing of travel lanes), ladder crosswalks and sidewalk bulb-outs throughout the city, according to a system of priorities tied to safety and neighborhood acceptance.

- The Plan creates a new category to pay for strategic initiatives, including studies to better integrate transportation with land use densification efforts, such as infill housing development along transit corridors and nodes like Geary, Van Ness, and the Balboa Park BART/MUNI station. Funds are also identified to provide small scale, highly cost-effective solutions like parking management in the neighborhoods.

ENVIRONMENTALLY SUPERIOR ALTERNATIVE

CEQA Guidelines require identification of an environmentally superior alternative. The One Cent Alternative is the environmentally superior alternative; its environmental advantages over the Expenditure Plan Alternative are not significant, however.

There are tradeoffs among the various issue areas analyzed for the alternatives. In general, the One Cent Alternative improves marginally upon the benefits of the Expenditure Plan Alternative, which in turn improves significantly upon the No Project Alternative. In several cases, the overall difference between the One Cent Alternative and proposed Expenditure Plan is one-half percent or less. The benefits of the One Cent Alternative are most pronounced in transportation. In the case of travel time impacts, however, the Expenditure Plan actually generates more travel time savings than the One Cent Alternative, because more travel lanes are required for conversion of lanes to transit facilities in the One Cent Alternative.

In terms of air quality and hazardous materials, the One Cent Alternative generally performs better than the Expenditure Plan Alternative as a result of the greater investment in transit. Impacts in terms of energy of the Half Cent and One Cent alternatives are comparable, although the Half Cent Alternative performs marginally better. In the areas of cultural resources, geology/seismicity, hazardous materials, noise and visual impacts, many of the impacts for both build alternatives include short-term construction impacts which are localized and temporary. Construction of several major projects will still occur under the No Project scenario. The advantage in the noise issue area is also relatively minor due to the tradeoff between auto versus transit noise.

Substantive disadvantages for the No Project Alternative are found in air quality, energy use, and transportation, which are three key issue areas in San Francisco.

Table 1: Summary of Impacts and Mitigation, SFCTA Draft EIR

	Impact	*Significance*	*Mitigation Measures*		*Significance after mitigation*
3.2	*Transportation*				
3.2-a	The Expenditure Plan would result in increase in average travel times for auto travel and decrease in average travel time for transit travel.	*Less than significant*			
3.2-b	The Expenditure Plan would result in reduction in vehicle hours traveled.	*Beneficial*			
3.2-c	Implementation of the Expenditure Plan will result in decrease in vehicle miles traveled (VMT) at level of service (LOS) F.	*Beneficial*			
3.2-d	Implementation of the Expenditure Plan would increase number of work opportunities within 30 minutes by auto and transit.	*Beneficial*			
3.2-e	The Expenditure Plan will result in an increase in transit ridership.	*Beneficial*			
3.3	*Air Quality*				
3.3-a	Construction activities associated with the transportation improvements in the proposed Expenditure Plan could result in short-term impacts on air quality near construction sites.	*Significant, mitigable*	A-1	SFCTA shall require that project sponsors comply with to undertake effective and comprehensive measures to appropriate measures that would minimize or eliminate any significant impacts on air quality associated with construction. Project sponsors shall commit to mitigation measures at the time of certification of their project environmental document. These measures may include:	*Less than significant*

Table 1: Summary of Impacts and Mitigation, SFCTA Draft EIR

	Impact	*Significance*	*Mitigation Measures*	*Significance after mitigation*
			– Appropriate dust abatement programs, patterned after the BAAQMD approach, shall be implemented by the sponsor for individual projects under the proposed Expenditure Plan. The BAAQMD approach calls for "basic" control measures that should be implemented at all construction sites, "enhanced" control measures that should be implemented at construction sites greater than four acres in area, and "optional" control measures that should be implemented on a case-by-case basis at construction sites that are large in area, located near sensitive receptors or which, for any other reason, may warrant additional emissions reductions (BAAQMD, 1999). – Mitigation measures included in the Caltrans' Highway Design Manual that are designed to limit air quality impacts from construction should be used by the project sponsor, as appropriate, during the design phase of projects and written into construction documents. – If a specific project under the Expenditure Plan would entail the demolition of a building containing asbestos materials, consultation with BAAQMD staff concerning the specific requirements of Regulation 11, Rule 2 (Asbestos Demolition, Renovation and Manufacturing) of BAAQMD's regulations.	
3.3-b	Transportation improvements proposed as part of the Expenditure Plan, including transit service expansions/enhancements and major new roadway capital projects could reduce emissions of criteria pollutants (ROG, PM-10 and CO) and increase NOx emissions.	*Beneficial for ROG, PM-10, and CO; Less than significant for NOx*		

Table 1: Summary of Impacts and Mitigation, SFCTA Draft EIR

	Impact	*Significance*	*Mitigation Measures*		*Significance after mitigation*
3.4	*Biological Resources*				
3.4-a	Transportation improvements in the Expenditure Plan could adversely affect wetlands and other aquatic resources.	*Significant, mitigable*	B-1	At the time of project certification, project sponsors shall agree to comply with mitigation measures to protect jurisdictional waters and other sensitive habitat, as well as special-status plant and wildlife species. This requirement obligates project sponsors to implement measures that avoid, minimize, and compensate for significant impacts sensitive biological resources within or adjacent to the project area. In accordance with guidelines of the Army Corps of Engineers (Corps), the Environmental Protection Agency (EPA), U.S. Fish and Wildlife Service (USFWS), and California Department of Fish and Game (CDFG), a goal of "no net loss" of wetland acreage and value will be implemented, wherever possible, through avoidance of the resource. Mitigation for wetlands impacts would be based on project-specific wetland mitigation plans, subject to approval by the Corps and commenting agencies. Mitigation for placing fill in wetlands would be partially achieved by avoiding wetlands, and by minimizing fill where avoidance is not feasible.	*Less than significant*
3.4-b	Transportation improvements in the Expenditure Plan could cause substantial disturbance of biologically unique or sensitive communities, including CDFG-recognized protected plant communities and other habitat important to special status species, such as Eucalyptus and Monterey pine groves.	*Significant, mitigable*	B-2	In accordance with guidelines of the Corps, EPA, USFWS, and CDFG, a goal of "no net loss" shall be achieved through avoidance of the resource, or through creation or restoration of habitat of superior or comparably quality. Where applicable, projects shall conform to the provisions of special area management or restoration plans such as the Baylands Ecosystem Habitat Goals report (Goals Project 1999) or the Presidio Vegetation Management Plan (NPS, 2001).	*Less than significant*
3.4-c	Proposed transportation improvements in the Expenditure Plan could have deleterious impacts	*Significant, mitigable*	B-3	Project sponsors shall demonstrate compliance with the provisions of CEQA and NEPA, as applicable, prior to project approval by the SFCTA. At the time of project certification, project sponsors shall agree to comply	*Less than significant*

Table 1: Summary of Impacts and Mitigation, SFCTA Draft EIR

Impact	*Significance*	*Mitigation Measures*	*Significance after mitigation*
on special-status plant and wildlife species identified as endangered, threatened, candidate, and/or special status by the CDFG or USFWS.		with mitigation measures to protect special-status plant and wildlife species. This requirement obligates project sponsors to implement measures that avoid, minimize, and compensate for significant impacts to special-status species and their habitat. Typical measures that may be included by project sponsors include: – In support of CEQA, NEPA, and CDFG and USFWS permitting processes for individual Expenditure Plan transportation projects, biological and wetland surveys shall be conducted as part of the environmental review process to determine the presence and extent of sensitive habitats and/or species in the project vicinity. Surveys shall follow established methods and shall be undertaken at times when the subject species is most likely to be identified. In cases where impacts to state- or federal-listed plant or wildlife species are imminent, formal protocol-level surveys may be required on a species-by-species basis to determine the local distribution of these species. Consultation with the USFWS shall be conducted at an informal level for transportation projects that could adversely affect federal candidate, threatened, or endangered species to determine the need for further consultation or permitting actions. – Project designs shall be reconfigured, whenever possible, to avoid sensitive wetland or other sensitive communities and to avoid temporary and permanent disturbances to wetland and riparian corridors. Projects shall minimize ground disturbances and construction footprints near sensitive areas to the extent practicable. – To the extent practicable, project activities in the vicinity of sensitive resources shall be completed during the period that best avoids disturbance to plant and wildlife species present (e.g., February 1 through August 31 for breeding birds or April 15th through October 15th for work in and around streams). – Individual projects shall minimize the use of in-water construction	

Table 1: Summary of Impacts and Mitigation, SFCTA Draft EIR

Impact	*Significance*	*Mitigation Measures*	*Significance after mitigation*
		methods in areas that support sensitive fish species, especially when fish are present. In the event that equipment needs to operate in any watercourse with flowing or standing water, a qualified biological resource monitor shall be present at all times to alert construction crews to the possible presence of nesting birds, California red-legged frog, or other aquatic species at risk during construction operations. – If special status plants are identified in the vicinity of proposed construction activities and these plants could be avoided by construction, biological monitors shall locate and fence off sensitive resources before construction activities begin and, where required, shall inspect areas to ensure that barrier fencing, stakes, and setback buffers are maintained during construction. For work sites located adjacent to special-status plant or wildlife populations, a biological resource education program shall be provided for construction crews and contractors (primarily crew and construction foremen) before construction activities begin. – Biological monitoring shall be particularly targeted for areas near identified habitat for federal and state-listed species, and a "no take" approach shall be taken whenever feasible during construction near special-status plant and wildlife species. – If special status plants are identified within proposed construction areas and avoidance of these areas is infeasible, CDFG and USFWS, as applicable, would be consulted to develop an acceptable plan for transplant, salvage, cultivation, or re-establishment of the species at suitable sites. – Topsoil would be salvaged and stored prior to construction, then re-spread following construction and implementation of other appropriate site restoration measures (such as final grading, soil scarification, and erosion control). In situations where post-construction monitoring indicates that this technique has not resulted in successful re-establishment of special status plants, then seeds or	

Table 1: Summary of Impacts and Mitigation, SFCTA Draft EIR

	Impact	*Significance*		*Mitigation Measures*	*Significance after mitigation*
				cuttings of the species shall be gathered from nearby populations, and shall be used in a cultivation and planting program that is appropriate for the horticultural requirements of the species. Re-introduction of the plant would be accomplished through sowing of seeds or planting of cultivated plants in the construction area or in another suitable location for which long-term site protection can be ensured. The restored area shall be comparable in size, soil type, exposure, dominant vegetation, and other critical habitat elements to the source population. Control of exotic weeds shall be implemented to prevent degradation of the habitat for native species. All components of the revegetation plan shall be subject to approval of CDFG or USFWS.	
3.4-d	Construction activities could adversely affect special status nesting raptor species.	*Significant, mitigable*	B-4	Project sponsors shall demonstrate compliance with the provisions of CEQA and NEPA, as applicable, prior to project approval by the SFCTA. At the time of project certification, project sponsors shall agree to comply with mitigation measures to avoid and minimize impacts to nesting raptors. Typical measures that may be included by project sponsors include: – To avoid and minimize impacts to nesting raptors, preconstruction surveys would be performed prior to initiating construction activities during the breeding season (February 1 through August 31). If it is determined that young have fledged and are self-sufficient, no further mitigation would be required. – To avoid and minimize potential impacts to nesting raptors, a no-disturbance buffer zone would be established around active nests during the breeding season. The size of individual buffers could be adjusted based on an evaluation of the site by a qualified raptor biologist. Site evaluations and buffer zone adjustments would be done in conjunction with consultation with CDFG or according to CDFG protocols for specific species, when these exist.	*Less than significant*
3.4-e	Construction activities could impact nonlisted nesting bird species	*Significant, mitigable*	B-5	Project sponsors shall demonstrate compliance with the provisions of CEQA and NEPA, as applicable, prior to project approval by the SFCTA.	*Less than significant*

Table 1: Summary of Impacts and Mitigation, SFCTA Draft EIR

	Impact	*Significance*		*Mitigation Measures*	*Significance after mitigation*
	protected under the federal Migratory Bird Treaty Act and the California Fish and Game Code, as well as bat species of concern.			At the time of project certification, project sponsors shall agree to comply with mitigation measures to avoid impacts to nesting bird species protected under the federal Migratory Bird Treaty Act. Typical measures that may be included by project sponsors include:: – Concurrent with surveys described in Impact 3.4-d, general breeding bird and bat surveys shall also be performed. The above regulations combine to protect nearly every bird species that occurs in California on either a resident or migratory basis. The only species not afforded such protection are the English sparrow and the European starling. In addition, many bat species are designated as species of special concern by the federal government. If protected breeding birds or bats are detected during surveys, a buffer zone shall be established around active nesting or bat roosting sites in consultation with CDFG and USFWS.	
3.4-f	Construction that occurs within or adjacent to habitat that supports special status invertebrates may disrupt these species at vulnerable stages of their life cycle, or may eliminate host plants that are essential for completion of their life cycle.	*Significant, mitigable*	B-6	Project sponsors shall demonstrate compliance with the provisions of CEQA and NEPA, as applicable, prior to project approval by the SFCTA. Typical measures would include: – Prior to construction activities within or adjacent to potential habitat for special status invertebrates, a qualified wildlife biologist will conduct a survey for host plants. Wherever feasible, plants that may support special-status invertebrates during any stage of their life cycle would be fenced off and their removal avoided. No encroachment into the fenced areas would be permitted. The fencing would remain in place until all subsequent construction activities in the vicinity was completed. – If avoidance of host plants is not feasible, a plan to avoid or reduce adverse impacts to sensitive invertebrate species will be developed through informal consultation with CDFG and USFWS, if appropriate.	*Less than significant*

Table 1: Summary of Impacts and Mitigation, SFCTA Draft EIR

	Impact	*Significance*	*Mitigation Measures*	*Significance after mitigation*
3.4-g	Construction activities could cause mortality of common wildlife species.	*Less than Significant*		
3.4-h	Construction activities have the potential to conflict with provisions of federal, state, and local resource protection and conservation plans, as well as with policies and regulations established by land management agencies to protect biological resources occurring on lands within their jurisdiction.	*Less than significant*		
3.5	*Cultural Resources*			
3.5-a	Construction of new transportation projects supported by the Expenditure Plan has the potential to adversely affect known archaeological and historical resources in San Francisco.	*Significant, mitigable*	C-1: Project Sponsors shall demonstrate compliance with CEQA and the Public Resource Code by: – Undertaking, prior to individual transportation improvement project approval, a records review to determine the potential for, or existence of, cultural resources. – For development adjacent to sites with identified historic or archaeological resource, minimize degradation to the resource by studying the potential effects of: constructing the transportation projects and implementing appropriate measures to protect the cultural resources or site.	*Less than significant*
3.5-b	New development has the potential to disturb unidentified cultural resources that may have historic significance to a community or	*Significant, mitigable*	C-3: In addition to Measure C-2 (above), the following measures would reduce the impact to a level that is not significant. In areas of historic and archaeological sensitivity, require project sponsors to: – Undertake pre-construction surveys and monitoring during any	*Less than significant*

Table 1: Summary of Impacts and Mitigation, SFCTA Draft EIR

	Impact	*Significance*		*Mitigation Measures*	*Significance after mitigation*
	ethnic of social group.			ground disturbance for all transportation projects. – If evidence of a cultural resource is found during construction, implement the following actions: – Cessation of construction activities – Evaluation by a professional archaeologist or historian to evaluate the value of the resources found and to advise on a plan to preserve resources determined to be of significance.	
3.6	*Energy*				
3.6-a	Implementation of the Expenditure Plan projects would increase energy consumption within the county, compared to existing conditions.	*Less than significant*			
3.7	*Geology and Seismicity*				
3.7-a	Seismic events could damage existing and proposed transportation infrastructure and pose public safety risks through ground shaking, liquefaction, earthquake-induced landslides, differential settlement and tsunamis.	*Significant, mitigable*	G-1	Project sponsors shall demonstrate compliance with the provisions of CEQA and NEPA, as applicable, prior to project approval by the SFCTA. At the time of project certification, project sponsors shall agree to comply with mitigation measures to avoid and minimize impacts relating seismic and geological risks. Typical measures that may be included by project sponsors include: – The proposed projects shall be required to comply with the UBC, California Building Code and Caltrans design standards. This may include: a site-specific geotechnical investigation shall be conducted that includes, but is not limited to, an assessment of subsurface lithology, surficial soils, a seismic evaluation of potential maximum ground motion at the site, and dynamic characteristics of the proposed structure. In addition, projects located within liquefaction or	*Less than significant*

Table 1: Summary of Impacts and Mitigation, SFCTA Draft EIR

	Impact	*Significance*	*Mitigation Measures*		*Significance after mitigation*
				earthquake-induced landslide Seismic Hazard Zones shall be encouraged to comply with CGS Publication 117 (Guidelines for Evaluating and Mitigating Seismic Hazards). – Potential seismic hazards associated with projects located within the tsunami inundation area depicted on Figure 3.7-4 shall be minimized through designs to diminish wave inundation and associated damage. For example, precautionary measures such as specifying final foundation or roadbed elevations greater than the expected height of a tsunami with a given return frequency would be effective.	
3.7-b	Short- and long-term erosion hazards could occur.	*Significant mitigable*	G-2	SFCTA shall require project proponent to conduct project-level environmental review, and where appropriate project proponents shall obtain a National Pollutant Discharge Elimination System (NPDES) General Construction Permit from the Regional Water Quality Control Board, as discussed in Water Resources Section 3.11, in order to reduce potential erosion and subsequent sedimentation of surface waters for project sites that meet or exceed one acre in size. For projects that are less than one acre in size, SFCTA shall require project proponents to employ Best Management Practices to reduce soil erosion by water and wind. These could include, but are not limited to, restricting grading to the dry season, if necessary and practical, protecting all finished graded slopes from erosion using such techniques as erosion control matting and hydro-seeding, silt fencing, or other suitable measures outlined in the Association of Bay Area Governments' (ABAG) Manual of Standards for Erosion and Sediment Control Measures or the San Francisco Bay Regional Water Quality Control Board's Erosion and Sediment Control Field Manual.	*Less than significant*
			G-3	SFCTA shall require project proponents to ensure that project designs provide adequate slope drainage and appropriate landscaping to minimize potential future occurrences of slope instability and erosion.	

Table 1: Summary of Impacts and Mitigation, SFCTA Draft EIR

	Impact	*Significance*	*Mitigation Measures*		*Significance after mitigation*
3.7-c	Projects built on highly compressible, expansive, or corrosive soils could become damaged and weakened over time.	*Significant, mitigable*	G-4	SFCTA shall require project proponent to conduct project-level environmental review, and where appropriate, require that site-specific geotechnical investigations be conducted by qualified professionals (registered civil and geotechnical engineers, registered engineering geologists) to identify potential geologic hazards associated with surficial soils and subsurface sediments. Recommended corrective measures, such as structural reinforcement, soil treatment, or replacing existing soil with engineered fill shall be incorporated into project designs.	*Less than significant*
3.7-d	Construction in Serpentine rock could increase exposure to public safety risks.	*Significant, mitigable*	G-5	SFCTA shall require project proponent to conduct project-level environmental review, and where appropriate, require project proponents to employ specific measures such as having the resident engineer or field geologist on-site to identify serpentine material; laboratory testing of serpentine material to determine if it is friable; thorough watering of all exposed cut areas during excavation in the Franciscan Complex; upwind and downwind monitoring for fibers; continuous misting of stock piles and wetting and covering haul trucks carrying serpentine rock. Disposal of any spoils containing asbestos shall be at a certified facility.	*Less than significant*
3.7-e	Seismic strengthening of existing bridges, interchanges, and overpasses throughout the Bay Area. (beneficial)	*Beneficial*			
3.8	***Hazardous Materials***				
3.8-a	Construction activities requiring the use of hazardous materials may increase the risk of exposure to hazardous materials.	*Significant, mitigable*	H-1	SFCTA shall require project proponents to utilize best management practices and prepare a construction health and safety plan—as required by Cal OSHA—that describes all hazardous materials used during construction and their associated health hazards.	*Less than significant*

Table 1: Summary of Impacts and Mitigation, SFCTA Draft EIR

	Impact	*Significance*	*Mitigation Measures*		*Significance after mitigation*
				Best management practices could include the following: – Follow manufacturer's recommendations and regulatory requirements for use, storage and disposal of chemical products and hazardous materials used in construction; – Avoid overtopping construction equipment fuel gas tanks; – During routine maintenance of construction equipment, properly contain and remove grease and oils. – Properly dispose of discarded containers of fuels and other chemicals.	
3.8-b	Construction excavation could encounter contaminated materials, causing an increase in risk of exposure to hazardous materials.	*Significant, mitigable*	H-2	SFCTA shall require project proponents to undertake project-level analyses as appropriate for proposed new transportation improvements, and require project proponents to comply with applicable federal, State, and local regulations. As appropriate to the environmental review of specific projects, typical compliance activities would include the following: – For proposed Expenditure Plan projects, within the area covered under the Maher Ordinance, compliance with the Maher Ordinance requires testing of subsurface soil to determine the magnitude and extent of soil contamination. – For construction corridors that are located on or intersect a site listed with the RWQCB or SFDPH LOP as containing known or suspected hazardous materials subsurface impacts, collect soil samples in order to determine the potential extent of contaminated soil which will be disturbed during construction activities. Soil sampling plans and activities shall be subject to approval and oversight of the RWQCB or SFDPH LOP. Should construction activities intersect contaminated soil, removal and disposal of contaminated soil shall occur in accordance with all applicable regulatory requirements. – If any USTs are discovered during construction, all construction shall stop until the UST is removed under the guidance of the SFDPH	*Less than significant*

Table 1: Summary of Impacts and Mitigation, SFCTA Draft EIR

Impact		*Significance*	*Mitigation Measures*		*Significance after mitigation*
				LOP. Such removal shall include the over-excavation and disposal of any impacted soil that may be associated with such tanks to a degree sufficient to SFDPH LOP. – Full compliance with all applicable regulatory agency requirements, including those set forth by SFDPH LOP, the RWQCB, and the California DTSC regarding the potential re-use of impacted artificial fill, and the storage and transportation of impacted soil and groundwater. – Construction activities involving excavation that will proceed below the groundwater table may intercept groundwater, which has been impacted by hazardous materials. Groundwater dewatering activities shall comply with Mitigation Measure W-2, as discussed in Water Resources Section 3.11, which requires the project proponent to obtain a permit from the RWQCB or San Francisco Department of Public Works prior to discharge of groundwater to local water bodies or San Francisco's stormwater/sewer system, respectively. – Create a project and site-specific health and safety plan. This health and safety plan shall discuss and address construction worker exposure to potential hazardous materials or impacted soil and groundwater which may be encountered during construction activities, based upon known or suspected contaminated sites, as discussed in Mitigation Measure H-1.	
3.8-c	Disturbance of structural and building components (i.e., asbestos, lead, PCBs, and PAHs) could expose construction workers, the public, or the environment to hazardous conditions.	*Significant, mitigable*	H-3	SFCTA shall require project proponents to undertake environmental review of specific projects, and where disturbance of structural or building components is involved, undertake the following steps, as appropriate to the environmental review of specific projects: – Prior to the demolition of any building, a pre-demolition asbestos containing material (ACM), lead-based paint (LBP), and PCB survey shall be performed, in accordance with State and local standards. Abatement of PCBs, known or suspected ACMs, and loose or peeling	*Less than significant*

Table 1: Summary of Impacts and Mitigation, SFCTA Draft EIR

	Impact	*Significance*	*Mitigation Measures*		*Significance after mitigation*
				LBP in accordance with State and Local standards shall occur prior to demolition or construction activities that would disturb those materials. Survey and abatement of these substances shall be conducted in accordance with a health and safety plan, as required by Cal OSHA. – Precautions and work practices in compliance with the San Francisco Building Code, Chapter 36, shall be initiated to appropriately handle areas identified as containing lead-based paint. – Full compliance with notification requirements under applicable federal regulations regarding hazardous air pollutants, including asbestos shall be required. The Bay Area Air Quality Management District is vested by the California legislature with authority to regulate airborne pollutants, including asbestos, through both inspection and law enforcement, and is to be notified ten days in advance of any proposed demolition or abatement work. – PCB-, PAH-, lead- and asbestos-containing material, shall be disposed of in accordance with all applicable laws and regulations.	
3.8-d	Expenditure Plan projects would decrease the risk of human exposure and environmental release of a hazardous material.	*Beneficial*			
3.9	*Noise*				
3.9-a	Construction activities associated with the transportation improvements in the proposed Expenditure Plan would have short-term noise and vibration impacts on adjoining sensitive areas.	*Significant, mitigable*	N-1	SFCTA shall require that project sponsors comply with CEQA (and NEPA if appropriate) prior to project approval by SFCTA. Project sponsors shall commit to mitigation measures at the time of certification of each environmental document and at the time of project approval to comply with construction noise mitigation normally required City of San Francisco ordinances. Construction mitigation measures generally limit construction activities to times when construction noise would have the least effect on adjacent land uses, and would require such measures as	*Less than significant*

Table 1: Summary of Impacts and Mitigation, SFCTA Draft EIR

	Impact	*Significance*		*Mitigation Measures*	*Significance after mitigation*
				properly muffling equipment noise, and turning off equipment when not in use.	
3.9-b	Transportation improvements proposed as part of the Expenditure Plan could result in noise levels that approach or exceed the FHWA and FTA Noise Abatement Criteria .	*Significant, mitigable*	N-2	SFCTA shall require that project sponsors comply with CEQA (and NEPA if appropriate) prior to project approval by SFCTA. Project sponsors shall commit to mitigation measures at the time of certification of their environmental document. Noise mitigation measures must respond to the land use compatibility criteria included in the San Francisco General Plan (and shown in Table 3.9-5). If federal funding is used for the project, mitigation measures must also conform to applicable FHWA and FTA noise abatement criteria. These commitments obligate project sponsors to implement measures that would minimize or eliminate any significant impacts. Typical mitigation measures that should be considered by project sponsors shall include but not be limited to: – Adjustments to proposed roadway or transit alignment to reduce noise levels in noise sensitive areas. Depressed roadway alignments are effective at mitigating roadside noise levels. – Insulation of buildings or construction of noise barriers around sensitive receptors. – Vibration isolation of track segments. – Construction of sound walls adjacent to new or modified roads or transit lines, especially when projects are located in the vicinity of sensitive receptors. Noise level increases could, in most cases, be mitigated to levels at or below existing levels if soundwalls were constructed along the rights-of-way. A determination of the specific heights, lengths and feasibility of soundwalls must be part of the project-level environmental assessment.	*Less than significant*
3.10	*Visual Resources*				
3.10-a	Construction of new transportation	*Significant,*	V-1:	SFCTA shall require project proponents to undertake project-level analyses	*Less than*

Table 1: Summary of Impacts and Mitigation, SFCTA Draft EIR

	Impact	*Significance*	*Mitigation Measures*		*Significance after mitigation*
	projects supported by the Expenditure Plan has the potential to adversely affect visual resources in San Francisco during period of construction.	*mitigable*		as appropriate for proposed new transportation improvements, and require project proponents to comply with applicable federal, State, and local regulations. As appropriate to the environmental review of specific projects, project sponsors shall incorporate the following measures: – Minimize the visibility of construction staging areas where possible; use fencing and screening materials that are low contrast, consistent with the surrounding landscape. – Revegetate graded slopes and exposed earth surfaces at the earliest opportunity.	*significant*
3.10-b	Once built, certain transportation projects supported by the Expenditure Plan have the potential to adversely affect visual resources in San Francisco over the long term.	*Significant mitigable*	V-2:	SFCTA shall require project proponents to undertake project-level analyses as appropriate for proposed new transportation improvements, and require project proponents to comply with applicable federal, State, and local regulations. As appropriate to the environmental review of specific projects, project sponsors shall incorporate the following measures – Analyze and incorporate considerations of blockage of panoramic views and views of significant features – Minimize alteration of appearance of area near a scenic highway.	*Less than significant*
3.11	*Water Resources*				
3.11-a	Construction activities could result in erosion and cause subsequent sedimentation of stormwater runoff, or introduce pollutants to runoff from the use of hazardous materials.	*Significant, mitigable*	W-1	SFCTA shall require project proponents to obtain an NPDES permit from the RWQCB for construction projects that incorporate over one acre, as required by the SWRQC. Under NPDES permit regulations, the project proponent would be required to prepare and implement a Storm Water Pollution Prevention Plan (SWPPP). The SWPPP be consistent with the State Construction Storm Water General Permit, the Manual of Standards for Erosion and Sedimentation Control by the Association of Bay Area Governments, policies and recommendations of the local urban runoff program (city and/or county), and the recommendations of the RWQCB. Implementation of the SWPPP shall be enforced by inspecting agencies	*Less than significant*

Table 1: Summary of Impacts and Mitigation, SFCTA Draft EIR

Impact	*Significance*	*Mitigation Measures*	*Significance after mitigation*
		during the construction period. Typical elements of a SWPPP include: – Excavation and grading activities will be scheduled for the dry season only (April 15 to October 15), to the extent possible. This will reduce the chance of severe erosion from intense rainfall and surface runoff, as well as the potential for soil saturation in swale areas. – If excavation occurs during the rainy season, storm runoff from the construction area will be regulated through a stormwater management/erosion control plan that may include temporary onsite silt traps and/or basins with multiple discharge points to natural drainages and energy dissipaters. Stockpiles of loose material will be covered and runoff diverted away from exposed soil material. If work is stopped due to rain, a positive grading away from slopes will be provided to carry the surface runoff to areas where flow can be controlled, such as the temporary silt basins. Sediment basin/traps will be located and operated to minimize the amount of offsite sediment transport. Any trapped sediment will be removed from the basin or trap and placed at a suitable location onsite, away from concentrated flows, or removed to an approved disposal site. – Temporary erosion control measures will be provided until perennial revegetation or landscaping is established and can minimize discharge of sediment into nearby waterways. For construction within 500 feet of a water body, straw bales will be placed upstream adjacent to the water body. – After completion of grading, erosion protection will be provided on all cut-and-fill slopes. Revegetation will be facilitated by mulching, hydroseeding, or other methods and should be initiated as soon as possible after completion of grading and prior to the onset of the rainy season (by November 1).	

Table 1: Summary of Impacts and Mitigation, SFCTA Draft EIR

	Impact	*Significance*	*Mitigation Measures*		*Significance after mitigation*
				– Permanent revegetation/landscaping will emphasize drought-tolerant perennial ground coverings, shrubs, and trees to improve the probability of slope and soil stabilization without adverse impacts to slope stability due to irrigation infiltration and long-term root development. – BMPs selected and implemented for the project will be in place and operational prior to the onset of major earthwork on the site. The construction phase facilities will be maintained regularly and cleared of accumulated sediment as necessary. – Hazardous materials such as fuels and solvents used on the construction sites will be stored in covered containers and protected from rainfall, runoff, and vandalism. A stockpile of spill cleanup materials will be readily available at all construction sites. Employees will be trained in spill prevention and cleanup, and individuals will be designated as responsible for prevention and cleanup activities.	
3.11-b	Construction activities may discharge groundwater impacted with hazardous materials during dewatering.	*Significant, mitigable*	W-2	SFCTA shall require project proponent to undertake project-level analyses as appropriate for proposed new transportation improvements, and take appropriate steps relating to groundwater discharge where excavation activities are involved, to reduce any potential impacts to a less-than-significant level. The project proponent shall obtain a discharge permit from the City of San Francisco's Public Works Department prior to discharge of groundwater generated by excavation dewatering activities to San Francisco's stormwater/sewer system. For projects located in areas where dewatering activities would require the discharge of groundwater generated by construction to a local water body, the project proponent shall obtain a permit from the RWQCB.	*Less than significant*
3.11-c	Construction activities would increase impervious surface areas causing an increase in stormwater runoff volume, rate, and nonpoint-	*Significant, mitigable*	W-3	The project proponent shall be required to meet the provisions of the federal Clean Water Act by submitting plans to eliminate and control potential pollutants in storm water discharge through incorporation of	*Less than significant*

Table 1: Summary of Impacts and Mitigation, SFCTA Draft EIR

Impact	*Significance*	*Mitigation Measures*	*Significance after mitigation*
source pollutant levels.		structural and treatment BMPs.	
		W-4 Projects shall be designed to allow lateral transmission of stormwater flows across transportation corridors with no increased risk of upstream flooding. Culverts and bridges shall be designed to adequately carry drainage waters through project sites.	

1 Introduction

This Program Environmental Impact Report (EIR) has been prepared on behalf of the San Francisco County Transportation Authority in accordance with the California Environmental Quality Act (CEQA). This EIR analyzes the proposed 30-year extension of the current half-cent sales tax for transportation in San Francisco (known as Prop B), and the New Expenditure Plan that would guide the use of funds generated by the sales tax. This chapter provides an introduction to the purpose, approach, agency use, scope, and organization of this EIR.

1.1 OVERVIEW

The New Expenditure Plan identifies a program of investments to be funded from a half-cent (0.5 percent) transportation sales tax that will be presented to San Francisco voters in November 2003. The projects and programs included in the Expenditure Plan are designed to improve San Francisco's transportation system over the next 30 years and are intended to help implement the long-range vision for the development of San Francisco's transportation system as articulated in the San Francisco Countywide Transportation Plan. The Countywide Transportation Plan, which is being developed in parallel with the New Expenditure Plan, is the City's blueprint to guide the development of transportation projects and policies.

The major objectives of the Countywide Transportation Plan are to enhance mobility and accessibility throughout the city, improve safety for all transportation system users, support the city's economic development and the vitality of our neighborhoods, sustain environmental quality, and promote equity and efficiency in transportation investments. The Countywide Transportation Plan is a living document, updated on a regular basis to identify and address changing needs and regional trends, and align them with available funding.

The primary goal of the Expenditure Plan is to implement the priorities of the Countywide Transportation Plan through investment in a set of projects and programs that include planning, maintenance and rehabilitation, and improvements to the city's multi-modal transportation system.

The Expenditure Plan takes into account the historic development of San Francisco as a pedestrian-scaled city whose urban form and character have evolved together with its public transit system and with a street network that provides open space and accessibility for pedestrians and bicyclists, in addition to providing for the movement of vehicles. In order to maintain the city's livability and character, the Expenditure Plan supports an efficient, accessible, and integrated transit system as part of a balanced transportation strategy for the city. Accessibility, cost effectiveness, and compatibility with existing and planned land uses, especially housing, will be required of projects receiving funds under the New Expenditure Plan.

1.2 PURPOSE AND NEED

In November 1989, San Francisco voters approved Proposition B, a half-cent sales tax to fund transportation improvements according to a 20-year Expenditure Plan. In the 14 years since the program's inception, Proposition B sales tax revenues have funded over $760 million in transportation improvements throughout the city.

While the sales tax authorized by Proposition B does not sunset until 2010, there are compelling reasons to adopt a New Expenditure Plan and continue the tax to fund the improvements proposed in the new plan. All the major capital projects envisioned in the Prop B Expenditure Plan either have already been delivered or are currently being delivered. This includes the Embarcadero Roadway, the F-Line of Historic Streetcars, the 3rd Street Light Rail Line, the renovation of the entire MUNI bus, trolleybus and streetcar fleet, and a number of other major capital improvements. San Francisco's ability to deliver a new crop of major capital projects depends on its success in capturing discretionary federal and state dollars, but those dollars require local matching funds. The reauthorization is the logical source of those matching funds for capital projects. Prop B included a number of "programmatic" categories, such as funding for the paratransit program or for operations and maintenance of the F-Line. A number of these categories have been tremendously successful, and as a result have required larger ongoing funding levels than those originally anticipated in Prop B. Reauthorization of Prop B can provide an answer to the long term financial viability of these programmatic categories. Finally, in the past 14 years the city's needs have evolved and the transportation profession has come up with whole classes of projects and techniques, such as traffic calming, that were not part of the transportation planners' armamentarium back in 1989, when the original Prop B was approved. A reauthorized Prop B provides an opportunity to adopt a New Expenditure Plan which devotes sufficient funds to these new categories.

The Authority therefore seeks to adopt a New Expenditure Plan and extend the existing tax to provide the revenues necessary to implement the New Plan. This combined action will be referred to in this document as "the Proposition" and constitute the “Proposed Project” for this EIR. The Proposition would provide sales tax funding for transportation projects over the next 30 years, starting April 1, 2004. The existing local transportation sales tax rate of one-half of one percent would not change. The Authority will present the Proposition to voters on the November 2003 ballot. The purpose, objectives and goals of the Proposed Project are outlined in Chapter 2 of this EIR.

1.2.1 PURPOSE OF THE PROGRAM EIR

The purpose of this EIR is to inform decision makers and the public of the environmental impacts of the Proposed Project and to meet the requirements of CEQA. Pursuant to the provisions of CEQA and related case law, agency-initiated ballot measures and adoption of the Expenditure Plan must include analyses of the potential significant environmental impacts associated with implementation of these actions. CEQA was conceived primarily as a means to require public agency decision-makers to document and consider the environmental implications of their actions. The California Supreme Court has stated that the CEQA process "protects not only the environment, but also informed self-government."

This Program EIR contains an analysis of the proposed Project and all potential environmental impacts expected to result from implementation of the various transportation improvement programs and projects identified, as well as mitigation measures that could avoid or minimize the significant environmental impacts identified. In accordance with CEQA requirements, this EIR also identifies and evaluates alternatives to the proposed New Expenditure Plan. Responses to the comments submitted during the 30-day public review of this Draft EIR will be compiled into the Final EIR. The Final EIR will be subject to certification by the Authority, prior to adoption of the New Expenditure Plan and placement of the Sales Tax Reauthorization measure on the November ballot.

This environmental assessment is designed to inform decision-makers, responsible and trustee agencies, and the general public of the range of potential environmental impacts associated with the proposed Project. However, it is an informational document, not a decision document.

This Program EIR represents the best effort to evaluate the proposed Expenditure Plan given its 30-year planning horizon. It can be anticipated that conditions will change; however, the assumptions used are the best available at the time of preparation and reflect existing knowledge of patterns of development, travel patterns, modes of travel, and technological factors.

1.3 AGENCY USE OF THIS DOCUMENT

CEQA (Section 15124(d)) requires EIRs to identify the agencies that are expected to use the EIR in their decision-making and the approvals for which the EIR will be used. This Draft EIR serves as a full-disclosure document, enabling decision-makers to make informed decisions on the proposed Project. It will also serve as a source of information in the preparation of initial studies and environmental review for subsequent transportation projects, infrastructure provision, and land use planning. The lead agencies for transportation projects analyzed in this EIR may use the analysis as the basis of their regional cumulative analysis of the impacts of the specific projects, together with the projected growth in the region.

Bay Area counties may incorporate information provided in this Draft EIR into future county transportation plans such as Congestion Management Programs, Countywide Transportation Plans, or county bike and pedestrian plans. The projects in the New Expenditure Plan are all within San Francisco, but the city's status as a regional hub for transportation means some of these projects may have considerations for agencies outside the city. Other agencies that may use the Draft EIR include Caltrans, MTC, congestion management agencies, transportation authorities, transit providers (such as BART, AC Transit, MUNI, and Caltrain), and the Bay Conservation and Development Commission.

Bay Area counties may incorporate information provided in this Draft EIR into future county transportation plans such as Congestion Management Programs, Countywide Transportation Plans, or County bike and pedestrian plans. Other agencies expected to use the Draft EIR include Caltrans, congestion management agencies, transportation and land use planning authorities, transit providers (such as BART, AC Transit, MUNI, Caltrain, ACE, etc.), and the Bay Conservation and Development Commission.

1.4 PUBLIC CONCERNS AND INVOLVEMENT

Public participation was generated for this environmental assessment of the proposed Project primarily through issuance of a Notice of Preparation. Additionally, several public workshops have been held and a public hearing will be held by the Authority's Board of Commissioners to discuss the adequacy of the Draft EIR. Following the public hearing and 30-day comment period on the Draft EIR, the Final EIR (Response to Comments) will be issued. If the Authority Board certifies the Final EIR and so authorizes, a ballot measure will be put to San Francisco's voters on the November 2003 ballot. Passage of the ballot measure will approve extension of the half-cent sales tax and implementation of the proposed New Expenditure Plan.

1.4.1 PUBLIC OUTREACH

The key to ensuring the relevance and responsiveness of the New Expenditure Plan is to continue reaching out to the people and institutions that make San Francisco a great city. Toward that end, public outreach for the New Expenditure Plan is guided by the three-tiered strategy that includes: 1) policy steering committees, 2) technical working groups, and 3) community workshops and other opportunities for public input. These activities, together with extensive use of the Authority's website to disseminate information, are designed to ensure broad and inclusive public participation in the planning process.

Policy Steering Committees

The Transportation Authority Board and Committees (including the Plans and Programs Committee and Finance Committee) – together with the Authority's Citizen's Advisory Committee (CAC) and CAC Subcommittee on the Countywide Plan – provide regular guidance on, and oversight of development of the Countywide Plan and Expenditure Plan. In addition, the Authority receives advice from a Business Advisory Group (BAG) comprised of representatives from the business community. In April, the Transportation Authority Board convened the Expenditure Plan Advisory Committee (EPAC), a 21-member group that provides advice to the Transportation Authority Board on the design of the New Expenditure Plan. The EPAC is comprised of representatives from a broad range of community, business, and advocacy groups.

Technical Working Groups

Two separate Technical Working Groups consisting of staff from City agencies also provided input to, and guidance on, the development of the New Expenditure Plan. Member agencies helped to identify and prioritize future transportation system needs. A special technical working group comprised of travel demand modeling and land use forecasting experts reviewed the technical analyses of plan alternatives.

Community Workshops

Community outreach leading to development of the New Expenditure Plan included a series of public workshops between 1999 and 2002, to identify transportation needs and develop alternatives as part of the development of the Countywide Plan. These meetings included presentations on transportation needs citywide, and discussions about the particular issues and priorities in each neighborhood. Input from these meetings guided the identification and prioritization of New Expenditure Plan initiatives.

Meetings with advocacy and community groups continued in early 2003 and briefings to the public intensified with the release of the Draft Expenditure Plan in April at the start of the EPAC's work. As the plan evolved, the EPAC's meetings provided regular opportunities for public comment on, and input to the plan. Additionally, the Authority hosted two open houses on the New Expenditure Plan in May and June. Other outreach meetings for individual neighborhoods and interest groups are planned, including a neighborhood workshop in District 11 on June 28. Presentations to civic improvement and advocacy organizations scheduled for June and July include SPUR, the San Francisco Chamber of Commerce, Rescue MUNI, San Francisco Tomorrow, and others.

Authority Website

The Authority's website is a critical source of information for all aspects of the New Expenditure Plan. The latest information on the Expenditure Plan is available at the Authority's website (www.sfcta.org), along with agendas, announcements, and minutes for every Expenditure Plan Advisory Committee meeting.

1.4.2 NOTICE OF PREPARATION

In May 2003, the Authority issued a Notice of Preparation (NOP) for the Draft EIR on the Expenditure Plan and Sales Tax Reauthorization. The NOP was issued as a request for input regarding the scope and content of the environmental analysis. The NOP is sent to responsible agencies, interested parties, and organizations. CEQA (Section 15082(b)) requires that responsible agencies respond to the NOP within 30 days after receipt. The review period on the NOP extended from May 8, 2003 to June 9, 2003. The NOP is included within Appendix A of this EIR.1 Comments from agencies that responded to the NOP were considered in preparing the Draft EIR, which contains written responses to agencies that submitted comments.

---

[1] The EPAC adopted the funding priorities for the New Expenditure Plan on June 10. The Priority 1 structure, which makes up he substantive part of the New Expenditure Plan, was approved as originally proposed and described in the NOP.

1.5 SCOPE OF ANALYSIS AND DOCUMENTATION

This EIR evaluates the environmental impacts of the Authority's proposed New Expenditure Plan and Sales Tax Reauthorization. Because of the programmatic nature of the New Expenditure Plan, this EIR has been prepared as a Program EIR. As described in CEQA (Section 15168(a)(3)), a Program EIR "may be prepared on a series of actions that can be characterized as one large project and are related . . . in connection with the issuance of rules, regulations, plans, or other general criteria to govern the conduct of a continuing program."

A Program EIR can be used as the basic, general environmental assessment for an overall program of projects developed over the 30 year planning horizon. It allows the lead agency to look at the broad, regional impacts of a program of actions before its adoption and eliminates redundant or contradictory approaches to the consideration of regional and cumulative impacts.

As a Program EIR, this document focuses on the overall citywide effects of the sales tax measure and Expenditure Plan in the Planning Area; the analysis does not examine the effects of site-specific projects that may occur within the overall umbrella of this Plan in the future. This Program EIR will not obviate the need for environmental review of individual transportation projects subsequent to the adoption of the New Expenditure Plan. As individual project plans and designs are prepared pursuant to the New Expenditure Plan, project-specific environmental review with a finer level of detail will need to be conducted.

1.5.1 ISSUES EVALUATED

Information gathered about the environmental setting was used to define relevant planning issues, determine thresholds of significance, and evaluate potential impacts. Based on the initial analysis of environmental settings and written comments on the NOP, the Authority determined that the New Expenditure Plan could result in potentially adverse impacts in the following areas:

- Transportation;
- Air Quality;
- Biology;
- Cultural Resources;
- Energy;
- Geology and Seismicity;
- Hazardous Materials;
- Noise;
- Visual Resources; and
- Water Resources and Flooding.

Each of the above issues is fully evaluated in Chapter 3: Environmental Setting and Impact Analysis of this EIR. In addition, growth-inducing effects are analyzed in Chapter 5. Other issue areas were not specifically discussed because the Expenditure Plan would not result in potentially significant impacts in those areas. See Section 5.5 for a description of impacts found not to be significant. These impact areas will be addressed in project-specific environmental documents.

1.6 ORGANIZATION OF DRAFT EIR

This EIR contains all of the CEQA-mandated components (Section 15120), organized into the following chapters:

- ***Executive Summary.*** A summary description of the proposed Sales Tax Reauthorization measure and New Expenditure Plan and alternatives; areas of controversy and unresolved issues; and tabulation of all potential significant environmental impacts and proposed mitigation measures.
- ***Chapter 1: Introduction.*** A discussion of the purpose of and need for the New Expenditure Plan and Draft EIR; agency use of the Draft EIR; public concerns and involvement during environmental analysis; scope of the Draft EIR; documents incorporated by reference; and organization of this Draft EIR.
- ***Chapter 2: Project Description.*** An introduction to the history of the Authority, Proposition B, and the current Prop B Expenditure Plan; regional planning agencies; study area and regional location; a summary of project objectives; detailed description of the proposed New Expenditure Plan and major capital projects; and contents of the proposed Sales Tax Reauthorization ballot measure.
- ***Chapter 3: Environmental Setting and Impact Analysis.*** A comprehensive assessment of the environmental setting (existing conditions); description of potential environmental impacts; thresholds of significance; and presentation of mitigation measures intended to reduce potential impacts. The analysis is organized by major topic, including transportation; air quality; biology; cultural resources; energy; geology and seismicity; hazardous materials; noise; visual resources; and water resources and flooding. The methodology and assumptions for the overall analysis are described in the introduction to this chapter.
- ***Chapter 4: Alternatives.*** A description and comparison of the impacts of the proposed Expenditure Plan and two alternatives: No Project Alternative (continuation of Prop B through 2010 and the current Expenditure Plan); and One Cent Sales Tax Alternative (increased funds generated and additional projects identified). Following the comparison, an Environmentally Superior Alternative is identified.
- ***Chapter 5: CEQA Findings.*** A summary of the growth-inducing impacts of the Expenditure Plan; significant unavoidable environmental impacts; irreversible environmental changes; cumulative impacts; and impacts found not to be significant.
- ***Chapter 6: Report Authors.*** A detailed list of authors who contributed to this Draft EIR.
- ***Chapter 7: References and Agency Acronyms.*** A detailed list of references consulted in preparation of this EIR. Also included is a table of Agency acronyms.

- *Appendix A: Notice of Preparation*
- *Appendix B: Comparison of Expenditure Plan and Alternatives*

2 Project Description

The proposed project for this EIR is the reauthorization of the half-cent sales tax for transportation (approved by San Francisco voters in 1989, as Proposition B) and a New Expenditure Plan that would guide the use of funds generated by the measure. This chapter provides background information on the San Francisco County Transportation Authority, Proposition B, the Countywide Transportation Plan, the Regional Transportation Plan, and the proposed Expenditure Plan and sales tax measure. Key objectives and major capital projects in the New Expenditure Plan are discussed, and the proposed text of the sales tax reauthorization is provided.

2.1 INTRODUCTION AND BACKGROUND

2.1.1 SAN FRANCISCO COUNTY TRANSPORTATION AUTHORITY

The San Francisco County Transportation Authority (Authority) was created in 1989 by the voters of the City and County of San Francisco (City or San Francisco) to impose a transaction and use tax of one half of one percent to fund essential traffic and transportation projects, as set forth in the San Francisco County Transportation Expenditure Plan. Beginning in April 1990, the State of California Board of Equalization started collecting the sales tax revenues for the Authority.

The Authority's Board of Commissioners is composed of the eleven members of the San Francisco Board of Supervisors. However, pursuant to State Code Section 131.000, the Authority is governed by a separate administrative code from that of the City and operates as a special purpose government, independent of the City, and with its own bonding capacity.

The Authority is designated as the Congestion Management Agency (CMA) for the City. As such, the Authority prioritizes State and federal transportation funds for San Francisco, and is responsible for the development of the long-range Countywide Transportation Plan.

2.1.2 PROPOSITION B

In 1989, San Francisco voters approved Proposition B, a half-cent sales tax increase to fund citywide transportation improvements. Since the State of California Board of Equalization started collecting the sales tax revenues in April 1990, Proposition B sales tax revenues have funded over $760 million in transportation improvements throughout the City. Proposition B authorized the sales tax to be in effect for a period of twenty (20) years, and therefore collections are slated to end in 2010.

In theory, the Authority could propose to extend the existing tax beyond 2010 to fund planned transportation improvements. However, revenue anticipation bonds could not be issued against the new revenue until five years after first collection of the tax, thereby limiting the Authority's ability to provide matching funds for major new committed projects such as the Central Subway in a timely manner. Commitment of local funds is also necessary to obtain federal funding, an important consideration as the Authority prioritizes local investments in preparation of the reauthorization of the federal surface transportation Act and the 2005 Regional Transportation Plan. Finally, the structure of the existing Expenditure Plan for Proposition B does not provide adequately for needs that have arisen since 1989, such as neighborhood traffic calming and increased demand for bicycle facilities. Therefore, the Authority seeks to extend the half-cent sales tax and implement the proposed New Expenditure Plan (hereafter referred to as the "Proposition"). The new Proposition would provide sales tax funding for transportation projects for the next thirty (30) years, starting in April 2004 and through 2033, as described below in Section 2.2.

2.1.3 COUNTYWIDE TRANSPORTATION PLAN

The Countywide Transportation Plan (CWTP) is a living document that articulates a long-range vision, and action plan for the development of San Francisco's transportation system over the next 30 years. The Authority is required to prepare the CWTP according to State law, which also mandates that the CWTP shall be the basis for San Francisco's section of Regional Transportation Plan. The CWTP guides transportation investment and policy through its Action Plan, which includes the Expenditure Plan. The Expenditure Plan is a financially constrained, prioritized list of needed projects and programs that is proposed to receive sales tax funding. Because transportation system development needs exceed the investment levels proposed in the sales tax measure, the Expenditure Plan is proposed in the context of a larger CWTP funding strategy, which includes advocacy for new transportation revenues at the local, regional, State, and federal levels. The CWTP is being developed in parallel with the Expenditure Plan, and is scheduled for completion in FY03/04. Future updates to the CWTP will take place on a regular basis, in order to capture changing transportation system development needs and opportunities.

2.1.4 REGIONAL TRANSPORTATION PLAN

The 2001 Regional Transportation Plan (RTP), prepared by the Metropolitan Transportation Commission (MTC), guides transportation planning and funding throughout the nine-county Bay Area to the year 2025. The RTP is a key document memorializing the region's commitment to funding certain transportation projects and programs. The 2001 RTP seeks to improve mobility, promote safety and equity, and support community vitality.

The focus of the 2001 RTP is on the use of committed "Track 1" funds, – a combination of federal, State, regional, and local revenue sources to develop the regional transportation system. The 2001 RTP identifies several committed transportation projects in San Francisco, including: MUNI Third Street light rail extension to Chinatown (Central Subway); the replacement of the south access to Golden Gate Bridge (Doyle Drive); Caltrain system improvements; maintenance of the existing transportation system, and other street network improvements and transit enhancements. The Expenditure Plan must demonstrate consistency with the RTP, and does so by honoring commitments established in the RTP and the associated Regional Transit Expansion Policy, and also by reflecting the RTP's emphasis on maintaining and sustaining the existing transportation system before prioritizing system expansion projects. Furthermore, the evaluation of all future proposed alternatives used the 2001 RTP network as a starting point for analyses. The development of the 2003 CWTP and New Expenditure Plan enables San Francisco to identify local priorities and estimates of need for the next update of the RTP in 2005.

2.1.5 REGIONAL LOCATION AND STUDY AREA

The Authority determines transportation priorities and projects throughout of San Francisco. San Francisco is the only jurisdiction in California where the City and County boundaries are coterminous. As shown in Figure 2-1, the city is located at the northern end of the San Francisco Peninsula and forms the southern portion of the entrance to San Francisco Bay, known as the Golden Gate. The city's 46.7 square miles are bordered by the Pacific Ocean to the west, San Francisco Bay to the north and east, and the cities of Daly City and Brisbane to the south.

San Francisco is an active, compact city laid out on a street grid over rolling topography. Any combination of autos, buses, cable cars, bicyclists and pedestrians can be found moving up and over the city's many hills. The city has long been a magnet for business, culture, retailing, tourism and education. Its rich 150 year history reflects the cultures of the world and gives energetic diversity to its neighborhoods. San Francisco serves as the cultural center of the region, drawing workers and visitors from near and far to a wide range of economic activities including jobs, restaurants, theaters and other nightlife, museums, shopping, special events and festivals, historical sites, and other attractions.

2.2 DESCRIPTION OF PROPOSED ACTION

2.2.1 SALES TAX REAUTHORIZATION AND NEW EXPENDITURE PLAN

In September 2002, the Authority adopted a schedule to develop a New Expenditure Plan for the reauthorization of the local transportation sales tax. The Authority proposes to adopt a New Expenditure Plan and extend the current half-cent sales tax for 30 years, starting April 2004. The local transportation sales tax rate of half cent would not change. The Authority could bond against this revenue stream starting in 2004, and leverage significant amounts of State and federal funding by doing so. The New Expenditure Plan would provide funding for transportation needs that have surfaced since the original 1989 Expenditure Plan was approved, and it would be structured to take advantage of discretionary funding opportunities. If adopted by the Board of Supervisors, the Proposition, including the New Expenditure Plan, will be placed on the November 2003 ballot.

Development of the Authority's Countywide Transportation Plan (CWTP) serves as the foundation of the Expenditure Plan. The Expenditure Plan reflects the goals and priorities already identified in the CWTP, and includes a program of investments to implement the Plan. If approved by the voters of San Francisco, the sales tax measure would enable sales tax revenues to be collected over a thirty (30) year period in San Francisco, for use toward transportation

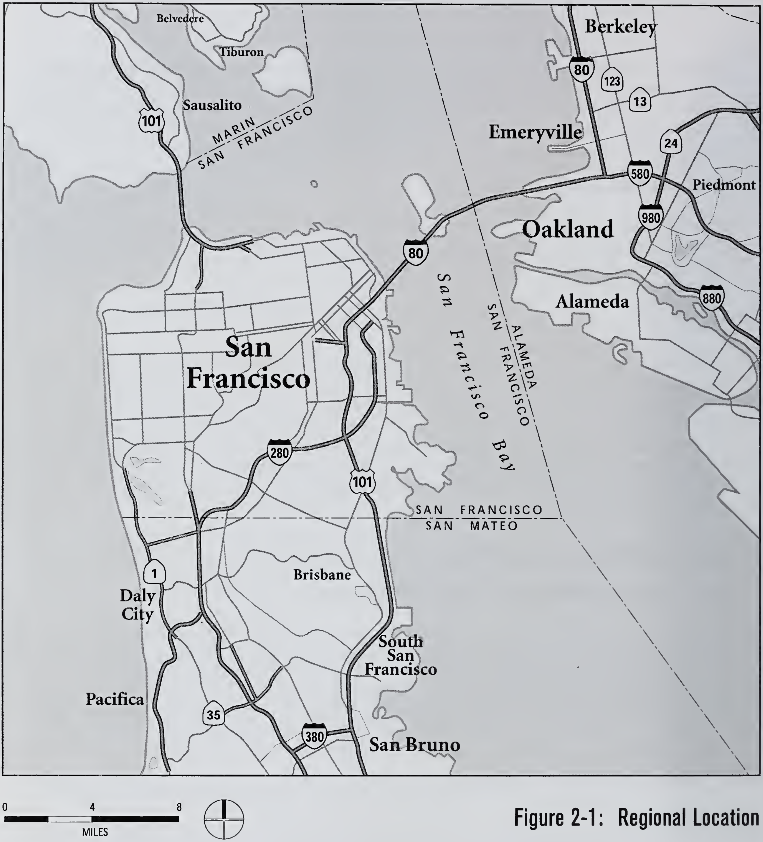


Figure 2-1: Regional Location

DYETT & BHATIA
Urban and Regional Planners

investment. For purposes of this EIR analysis, the proposed project is a program of investments to be funded by a sales tax of a half cent ("Proposition") for a period of 30 years (from 2004 through 2033).

The primary purpose of the New Expenditure Plan is to implement the goals of the CWTP through investment in a set of projects and programs that encompass planning, maintaining and improving the city's multi-modal transportation system. The proposed measure has a structure similar to the existing Prop B Expenditure Plan, with four main categories of projects and programs: Transit, Paratransit, Streets and Traffic Safety, and Transportation System Management/Strategic Initiatives, although some sub-categories are organized differently and new subcategories are proposed (e.g. Traffic Calming). The investment structure, by category, is listed in Table 2-1, and shown in Chart 2-1.

Table 2-1: SF Expenditure Plan Summary

2003 $Millions	*Total Expected Funding*[a]	*Total "Proposition"*	*% "Proposition"*
A. TRANSIT	9,944.3	1,781.1	65.5%
I. Major Capital Projects	3,748.7	689.6	
a. MUNI	*1,402.0*	*361.0*	
Rapid Bus Network including Real Time Transit Information	600.0	110.0	
3rd Street Light Rail (Phase 1)	100.0	70.0	
Central Subway (3rd St. LRT Phase 2)	647.0	126.0	
Geary LRT	55.0	55.0	
b. Caltrain	*2,141.0*	*313.1*	
Downtown Extension to a Rebuilt Transbay Terminal	1,885.0	270.0	
Electrification	182.5	20.5	
Capital Improvement Program	73.5	22.6	
c. BART Station Access, Safety and Capacity	*100.0*	*10.5*	
d. Ferry	*105.7*	*5.0*	
II. Transit Enhancements	200.7	52.5	
III. System Maintenance and Renovation	5,944.9	1,039.0	
a. Vehicles	3,486.0	575.0	
b. Facilities	945.7	115.7	
c. Guideways	1,563.2	348.3	
B. PARATRANSIT[b]	396.3	291.0	8.6%
C. STREETS AND TRAFFIC SAFETY	2,033.0	714.7	24.6%
I. Major Capital Projects	539.7	117.5	
a. Doyle Drive	420.0	90.0	
b. New and Upgraded Streets	119.7	27.5	

	II.		System Operations, Efficiency and Safety	155.5	60.6	
		a.	New Signals and Signs	55.5	41.0	
		b.	Advanced Technology and Information Systems (SFgo)	100.0	19.6	
	III.		System Maintenance and Renovation	887.5	281.7	
		a.	Signals and Signs	170.5	99.9	
		b.	Street Resurfacing, Rehabilitation, and Maintenance	680.2	162.7	
		c.	Pedestrian and Bicycle Facility Maintenance	36.8	19.1	
	IV.		Bicycle and Pedestrian Improvements	450.3	255.0	
		a.	Traffic Calming	142.0	70.0	
		b.	Bicycle Circulation/Safety	77.6	56.0	
		c.	Pedestrian Circulation/Safety	69.7	52.0	
		d.	Curb Ramps	66.0	36.0	
		e.	Tree Planting and Maintenance	95.0	41.0	
D.			TRANSPORTATION SYSTEM MANAGEMENT/STRATEGIC INITIATIVES	62.5	33.2	1.3%
	I.		Transportation Demand Management/Parking Management	28.9	13.2	
	II.		Transportation/Land Use Coordination	33.6	20.0	
			Total	12,436	2,820	100.0%
			Total "Proposition" Priority 1 (conservative forecast)		2,350	
			Total "Proposition" Priority 1 + 2 (medium forecast; most likely to materialize)		2,626	
			Total "Proposition" Priority 1+2+3 (optimistic forecast)[c]		2,820	

Notes:

[a] Total Expected Funding includes a 30-year forecast of expected revenues from existing federal, State and local sources, plus $2.82 B in reauthorized sales tax revenues, $230 M from a BART General Obligation Bond, and approximately $199 M from the proposed 3rd dollar toll on the Bay Area State-owned toll bridges.

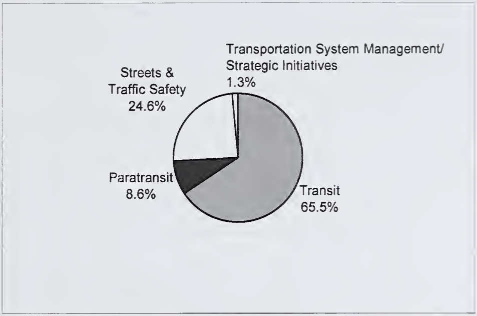
[b] With very limited exceptions, the total revenues forecast to be available over the 30-year Countywide Transportation Plan are for capital projects versus operations. Of all the funding sources that make up the $12 billion in expected funding, paratransit operating supports only eligible for "Proposition" and up to 10% of MUNI's annual share of Federal Section 5307 funds (currently about $3.5 M annually).

Therefore, total expected funding for Paratransit only reflects the "Proposition" and Section 5307. The remaining funds for the estimated $861M in paratransit operating costs for the next 30-years will be funded using other sources of operating funds, such as those currently included in MUNI's $460M annual operating budget.

[c] Priority 3 projects will only be funded if the revenues materialize under what the optimistic scenario for sales tax revenues. They are also included in case Priority 1 or 2 projects realize costs savings, identify other unanticipated sources of funding, experience delays or are canceled.

Source: San Francisco County Transportation Authority, 2003

Chart 2-1: Investment Priorities under the Proposed New Expenditure Plan



A detailed description of the projects and programs in the Expenditure Plan is provided in Table 2.2: Proposed Expenditure Plan Projects and Programs. Figure 2-2 illustrates these project locations. Highlights of the proposed Plan include:

- Transit funds are allocated to MUNI, the local transit operator, as well as to regional operators that serve San Francisco such as BART and Caltrain, and ferries. The majority of the transit funds, however, are proposed for MUNI. In general, transit investment is targeted to cost-effective network improvements such as system connectivity and reliability. The existing commitment to paratransit is also maintained.

- Funds are allocated to four proposed major capital projects: the Central Subway; extension of Caltrain to a rebuilt Transbay Terminal; a rapid bus network, including dedicated transit facilities on three key corridors; and the replacement of the south access to the Golden Gate Bridge (Doyle Drive) to enable seismic and safety improvements as well as multimodal access between the Marina and Presidio. These committed projects leverage sizable amounts of federal, State and regional discretionary funding.

- The Streets and Traffic Safety category accounts for roughly $715 million in revenues that will be devoted to maintaining the existing street infrastructure through resurfacing, rehabilitation and related tasks, installing new traffic and pedestrian signals, installing curb ramps for people in wheelchairs, improving pedestrian circulation and sidewalks, and enhancing pedestrian and bicycle safety. It is important to note that all of these investments are grouped under this category in order to ensure a more integrated management of the entire street right-of-way, from property line to property line, which is shared by all transportation system users including cars, buses, bicycles and pedestrians.

- The Plan takes responsibility for paying for the local share of deferred transit and roadway maintenance. In order to capture around $7 billion in regional, State and federal formula funds for transit maintenance, the plan must put in place $1.3 billion in local matching funds. This is a very significant number (about half of the total revenues expected from the reauthorized tax), but it is unavoidable if the city wants to maintain the current transportation system in good operating condition and avoid much larger rehabilitation costs, which would occur if regular maintenance were not performed.

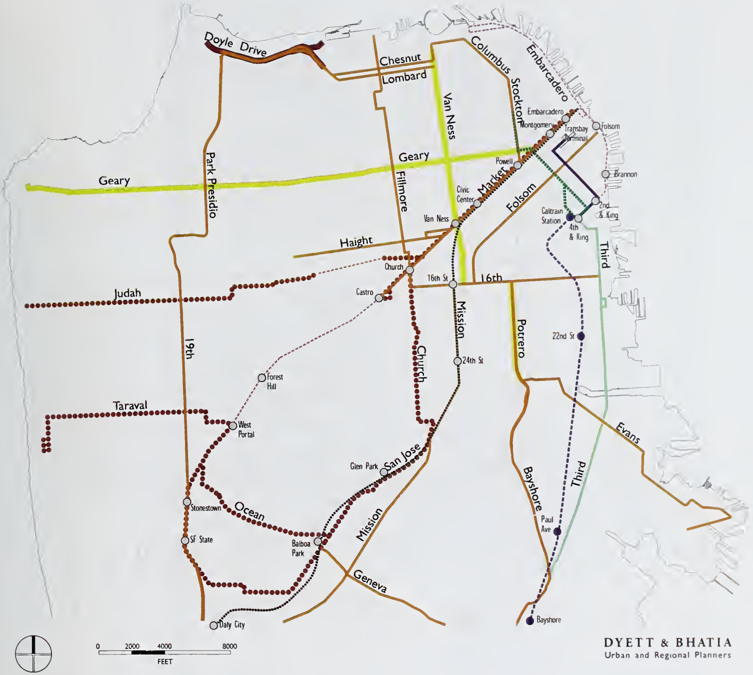
- The Plan creates a new sub-category under Streets and Traffic Safety for traffic calming projects around the city. These projects respond to the growing clamor from neighborhoods to provide an answer to the street safety problems caused by increased cut-through traffic in the neighborhoods, and related issues. Approximately $4 million per year would be made available to install speed humps, chicanes (narrowing of travel lanes), ladder crosswalks and sidewalk bulbouts throughout the city, according to a system of priorities tied to safety and neighborhood acceptance criteria.

- The Plan creates a new category to pay for strategic initiatives, including studies to better integrate transportation with land use efforts, such as housing development along transit corridors and nodes like Geary Boulevard, Van Ness Avenue, and the Balboa Park BART/MUNI station. Funds are also identified to provide small-scale, highly cost-effective solutions like parking management in the neighborhoods.

- The Plan emphasizes the need to coordinate transportation investments with land use decisions, and sets up mechanisms to facilitate and encourage such coordination.

2.2.2 TEXT OF BALLOT MEASURE

The full text of the proposed ballot measure, along with all documents related to the Sales Tax Reauthorization Ordinance and New Expenditure Plan, are available on the Authority's website (http://www.sfcta.org)..



▬ Doyle Drive Replacement

▬ Bus Rapid Transit (BRT)Corridors

— Transit Preferential Streets (TPS)
Bus Corridors

●●●●●●●●●●● Transit Preferential Streets
Light Rail Transit (LRT) Corridors

- - - - - LRT - Not requiring Transit
Preferential Streets

— Third Street LRT

·········· Third Street Subway

- - - - - Caltrain

— Caltrain Extension

·········· BART

○ BART/Muni LRT Stations

● Caltrain Stations

Figure 2-2: Proposed Expenditure Plan Projects

Table 2.2 : Proposed Expenditure Plan Projects and Programs EP CODE

	Project Sponsor	*Project Name*	*Project Description*
A	**Transit**		
A1: Major Capital Projects:			
A1a1	MUNI, DPT, DPW, Planning, SFCTA	Rapid Bus Network/ Real Time Transit Info	Implementation of a network of fast buses, including development of fast bus corridors with dedicated stations and exclusive transit lanes (also known as bus rapid transit or BRT) along Geary Boulevard (designed and built to rail-ready standards), Van Ness Avenue and Potrero Avenue; and Transit Preferential Street (TPS) treatments along key routes including Mission, Folsom, 19th Avenue, Geneva and the J, K, L, M, N, and F MUNI rail lines. TPS improvements are intended to be comparable to BRT but without the dedicated transit lanes. It is the intent that buses that operate along BRT corridors should be able to also operate along TPS corridors. It is the intent that the BRT and TPS corridors create an integrated citywide network of fast, reliable bus and surface light rail transit services connecting to existing grade-separated rail service provided by MUNI Metro, BART and Caltrain. It is the intent that the dedicated transit lanes and stations, sidewalk bulb-outs at bus stops, traffic signal pre-emption to speed up service, and real-time passenger information systems improve transit reliability and reinforce the sense of permanence of the improved service. Investments in BRT and TPS corridors shall be supportive of land use plans that include housing and other transit-compatible land uses. Other upgrades include landscaping and signage.
A1a2	MUNI	3rd Street Light Rail (Phase 1)	Complete construction of trackway, related facilities, and the Metro East light rail maintenance facility and yard, and purchase of new light rail vehicles (LRVs), including additional LRVs for expanded Mission Bay service.
A1a2	MUNI	Third Street Light Rail 2nd phase: Central Subway	Design and construction of the second phase of the 3rd Street Light Rail line as a subway linking the Caltrain Depot at 4th and King Streets and Pac Bell Park to Moscone Center, the BART/MUNI Metro stations on Market Street, Union Square and Chinatown. Includes preliminary and detailed engineering and construction costs.
A1b1	TJPA	Caltrain Downtown Extension to a rebuilt Transbay Terminal	Construction of a grade-separated extension of Caltrain to a rebuilt Transbay Terminal at the current site (Mission and 1st Streets) near BART and MUNI Metro. The extension and terminal are to be built as a single, integrated project.
A1b2	PJPB	Caltrain Electrification	Convert Caltrain service, line, and locomotives from diesel-powered to electric-powered. The project includes all stationary systems, substations, and signal system modifications, along with new locomotive

Table 2.2 : Proposed Expenditure Plan Projects and Programs EP CODE

	Project Sponsor	*Project Name*	*Project Description*
			rolling stock. San Francisco share only.
A1b3	PJPB	Caltrain Capital Improvement Program	Provides San Francisco's local match contribution for Caltrain's Capital Improvement Program (CIP) projects, including continued implementation of express tracks between San Francisco and San Jose to improve travel time and reliability. This work may include passing sidings, to allow express trains to bypass local service where additional tracks are not appropriate and/or right of way is limited. Maintenance and rehabilitation projects designed to improve service levels.
A1c	BART, MUNI, DPT, DPW	BART Station Access, Safety and Capacity	Improvements to stations and other facilities owned or operated by BART within San Francisco to enhance passenger safety, accessibility and capacity, (e.g. additional staircases), improved signage and security, real-time traveler information, intermodal access improvements (including improved access for passengers transferring from other transit services or bicycles), and street level plaza improvements. Improvements to station or system capacity, including additional staircases, elevators, and escalators, shall be eligible for funding in this category if the Transportation Authority finds that the costs of the station and system capacity improvements are shared equitably among the counties BART serves.
A1d	Port of San Francisco, MUNI, BART, PJPB, GGBHTD	Ferry and Intermodal Transit Facilities	Improvements to downtown ferry terminals to accommodate increases in ferry ridership. Included are additional intermodal connections, new ferry berths, improved emergency response systems, and landside improvements to serve increased passenger flows. If the Transportation Authority finds that additional funds for ferry improvements are available from another source, then intermodal transit facilities shall be eligible under this category, including improvements to accessibility, capacity, pedestrian and bicycle access, signage and wayfinding, pedestrian plazas and promenades, and amenities (e.g. seating, lighting and landscaping).
A2: Transit Enhancements:			
A2	MUNI, BART, DPT, DPW	Transit Enhancements	Programmatic improvements that promote system connectivity, close service gaps, and improve and expand transit service levels. · Extension of existing trolleybus lines and electrification of motor coach routes. Includes purchase of additional trolley buses for new service. · Extension of historic streetcar service from Fisherman's Wharf to Fort Mason. · Purchase and rehabilitation of historic light rail vehicles for new or expanded service. · Balboa Park BART/MUNI station access improvements to enhance · Relocation of the Caltrain Paul Avenue station to Oakdale Avenue. bus and MUNI M-line transit connections. · Purchase and installation of automatic passenger counters for MUNI vehicle fleet. · Purchase of additional light rail vehicles to expand service and reduce overcrowding on existing J, K, L, M, and N MUNI Light Rail lines. · Other transit enhancements to be prioritized by the Transportation

Table 2.2 : Proposed Expenditure Plan Projects and Programs EP CODE

	Project Sponsor	*Project Name*	*Project Description*
			Authority.
A3: Transit System Maintenance and Renovation			
A3a	MUNI, BART, PJPB	System Maintenance and Renovation: Vehicles.	Programmatic improvements for upgrade, rehabilitation and replacement of transit vehicles, spare parts and on-board equipment. Includes limited incremental operating funds for F-line historic streetcar operations. Rail car, trolley coach and motor coach renovation and replacement; retrofit of diesel coaches to reduce emissions. Funding for BART rail car renovation and replacement shall be eligible for funding under this subcategory if the Transportation Authority finds that the costs of rail car renovation and replacement are shared equitably among the counties BART serves. Trolleybus wheelchair-lift incremental operations and maintenance. Limited Incremental Operations and Maintenance for F-line.
A3b	MUNI, BART, PJPB	System Maintenance and Renovation: Facilities.	Programmatic improvements for upgrade, rehabilitation and replacement of transit facilities and facilities-related equipment. Includes limited incremental operating funds for MUNI Metro Extension/MUNI Metro Turnback operations. Rehabilitation, upgrades and/or replacement of existing facilities for maintenance and operations, including equipment. Rehabilitation, upgrades and renovation for rail stations including platform edge tiles, elevators, escalators, and faregates. Rehabilitation and/or replacement of facilities for administration. MUNI Metro Extension (MMX) incremental operations and maintenance.
A3c	MUNI, BART, PJPB	System Maintenance and Renovation: Guideways.	Rehabilitation, upgrades and/or replacement of rail, overhead trolley wires, signals, and automatic train control systems. Seismic retrofit and improvements to emergency lighting and ventilation.
B	**Para-transit**		
B	MUNI	Paratransit	Continued support for paratransit door-to-door van and taxi services, including operations support, phased replacement of accessible vans, and replacement and upgrades of supporting equipment such as debit card systems.

Table 2.2 : Proposed Expenditure Plan Projects and Programs EP CODE

	Project Sponsor	*Project Name*	*Project Description*
C	**Streets and Traffic Safety**		
C1: Major Capital Projects:			
C1a	SFCTA, Caltrans	Doyle Drive	Construction of a replacement project for the existing facility to improve earthquake and traffic safety. Project includes direct vehicular and transit access into the Presidio National Park, improved bicycle and pedestrian connections, a transit transfer center and connections to Marina Boulevard and Richardson Avenue.
C1b	DPW, DPT, MUNI, Caltrans, SFCTA, Port of San Francisco	New and Upgraded Streets	Upgrading and extension of streets and other vehicular facilities to bring them up to current standards; and construction of major bicycle and pedestrian facilities. Bernal Heights Street System Upgrading (this is a grandfathered Proposition B project). Construction of streets in Bernal Heights where existing streets are unimproved or below city standards to ensure adequate emergency vehicle response times. Great Highway Erosion Repair, including bicycle path development. San Francisco share of San Francisco/San Mateo Bi-County Study projects such as the extension of Geneva Avenue across US 101 to enable better multi-modal access, including a possible light rail extension to Candlestick Point. A new Illinois Street Bridge including multimodal (vehicle, rail, bicycle, and pedestrian) access across Islais Creek. A study to identify ways to reduce the traffic impacts of State Route 1 on Golden Gate Park. Other upgrades to major arterials such as 19th Avenue, to complement traffic calming on adjacent neighborhood streets, including pedestrian and bicycle safety improvements, intersection reconfiguration, transit preferential improvements and landscaping.
C2: System Operations, Efficiency and Safety:			
C2a	DPT; MUNI.	New Signals and Signs	Programmatic improvements including new traffic signs and signals (including pedestrian and bicycle signals) implementation of transit priority systems on select corridors; and new pavement markings such as raised flashing pavement reflectors and transit lane markings. Installation of red light photo enforcement equipment; electronic parking meters including meters that accept credit or pre-paid debit cards; and relocation of traffic maintenance shop to a new location.
C2b	DPT, MUNI	Advanced Technology and Information Systems (Sfgo)	Programmatic improvements using advanced technology and information systems to better manage roadway operations for transit, traffic, cyclists, and pedestrians. Includes interconnect and traffic signal controller technology and related communications systems to enable transit and emergency vehicle priority; dissemination of real time information to transit passengers; and management of vehicular flows and signalization to enhance bicycle and pedestrian safety. Closed circuit TV and communications systems (e.g. Variable Message Signs) for incident and special event traffic management as well as

Table 2.2 : Proposed Expenditure Plan Projects and Programs EP CODE

	Project Sponsor	*Project Name*	*Project Description*
			responsive/adaptive signal control and traveler information.
C3: System Maintenance and Renovation			
C3a	DPT	Signals and Signs	Programmatic improvements including maintenance and upgrade of traffic signs and signals. Signal maintenance includes new mast arms, LED signals, conduits, wiring, pedestrian signals, and left turn signals. Includes bicycle route signs and signals. Maintenance and upgrades of traffic striping and channelization to improve safety. Includes maintenance and replacement of red light enforcement cameras.
C3b	DPW	Street Resurfacing, Rehabilitation and Maintenance	Repaving and reconstruction of city streets to prevent deterioration of the roadway system, based on an industry-standard pavement management system designed to inform cost effective roadway maintenance. May include sidewalk rehabilitation, curb ramps and landscaping, subject to approved prioritization plan. Replacement of street repair and cleaning equipment according to industry-standards, such as asphalt pavers, dump trucks, sweepers, and front-end loaders. Provides for incremental Embarcadero Roadway operating and maintenance costs.
C3c	DPT, DPW	Pedestrian and Bicycle Facility Maintenance	Public sidewalk repair and reconstruction citywide. Additional pedestrian facility improvements including stairways, retaining walls, guardrails and rockfall barriers. Upgrades of substandard bicycle lanes; rehabilitation of bicycle paths, and reconstruction of MUNI passenger boarding islands.
C4: Bicycle and Pedestrian Improvements			
C4a	DPW	Traffic Calming	Programmatic improvements to neighborhood streets to make them more livable and safe to use for all users – pedestrians, cyclists, transit, and autos. Includes strategies to reduce traffic speeds and improve pedestrian and bicyclist safety and circulation such as: improvements to bicycle and walking routes (e.g. sidewalk widening, streetscape upgrades including landscaping), speed humps, corner bulb-outs, chicanes and channelization. New or improved pedestrian safety measures such as ladder crosswalks and pedestrian signals. Development of neighborhood and school area safety plans citywide, including above-mentioned strategies and complementary outreach and education programs. New traffic circles, signals and signage including flashing beacons and vehicle speed radar signs.

Table 2.2 : Proposed Expenditure Plan Projects and Programs EP CODE

	Project Sponsor	*Project Name*	*Project Description*
C4b	DPT, DPW	Bicycle Circulation/ Safety	Programmatic improvements to the transportation system to enhance its usability and safety for bicycles. Infrastructure improvements on the citywide bicycle network, such as new bike lanes and paths. Bicycle parking facilities such as bike racks and lockers. Support for bicycle outreach and education programs. Improvements must be consistent with the city's bicycle plan.
C4c	DPT, DPW, BART, PJPB	Pedestrian Circulation and Safety	Programmatic improvements to the safety and usability of city streets for pedestrians. Includes flashing pavement reflectors on crosswalks, pedestrian islands in the medians of major thoroughfares, sidewalk bulb-outs, sidewalk widenings, and improved pedestrian circulation around BART and Caltrain stations.
C4d	DPW	Curb Ramps	Construction of new wheelchair curb ramps and related roadway work to permit ease of movement for the mobility impaired. Reconstruction of existing ramps.
C4e	DPW	Tree Planting and Maintenance	Planting of new street trees and maintenance of new and existing trees in public rights-of-way throughout the city.
D	**Transportation System Management/ Strategic Initiatives**		
D1	MUNI, DPT, Planning, SFCTA.	Transportation Demand Management/ Parking Management	Develop and support continued Transportation Demand Management (TDM) and parking requirements for downtown buildings, special event sites, and schools and universities. Includes neighborhood parking management studies. Support related projects that can lead to reduction of single-occupant vehicle dependence including and citywide Bicycle Plan updates, Pedestrian Master Plan development and updates, and traffic circulation plans. Conduct transit service planning including a route restructuring study to optimize connectivity with rapid bus network and major transit facilities (e.g. Transbay Terminal and Balboa Park BART station). Funds for studies and projects to improve access of disadvantaged populations to jobs and key services.
D2	DPT, DPW, MUNI, Planning, SFCTA, BART, PJPB	Transportation/ Land Use Coordination	Transportation studies and planning to support transit oriented development and neighborhood transportation planning. Local match for San Francisco and regional Transportation for Livable Communities (TLC)/Housing Incentive Program (HIP) grant programs that support transit oriented development and fund related improvements for transit, bicyclists, and pedestrians including streetscape beautification improvements such as landscaping, lighting and street furniture.

3 Environmental Setting and Impacts

3.1 INTRODUCTION AND ASSUMPTIONS

This chapter contains the summary of existing environmental conditions and analysis of environmental impacts of the proposed Expenditure Plan and sales tax reauthorization, as described in Chapter 2. The chapter is organized by issue area; within each issue area, the environmental setting is described (including the regulatory setting), and significance criteria are established, beyond which impacts are considered to be significant. Please note that impacts of project alternatives (No Project and One Cent Sales Tax) are presented in Chapter 4 and cumulative impacts are addressed in Chapter 5.

3.1.1 ASSUMPTIONS REGARDING FUTURE SCENARIO

In order to assess the effects of the proposed Expenditure Plan, it is necessary to make assumptions about future environmental conditions at the time the Expenditure Plan is fully implemented. Since the sales tax measure would continue until 2034, the horizon year is 2034. However, it is assumed that the substantive physical improvements identified in the proposed Expenditure Plan will be completed by 2025, and that only maintenance and repair activities will be implemented in the remaining years to 2034. In this approach, the physical components of the proposed Expenditure Plan can be compared to future baseline conditions in 2025. Population projections from ABAG and regional traffic models and projections do not forecast beyond 2025. Attempting to model traffic conditions beyond 2025 would be speculative, as the RTP horizon is 2025. Therefore, a qualitative discussion of potential scenarios is provided for the time period between 2025 and 2034.

The EIR does not consider phasing of improvements or interim stages of the Plan between 2004 and 2025, as the purpose of the analysis is to evaluate the Plan as a whole.

Detailed assumptions for future growth patterns and the San Francisco transportation network are presented in Section 3.2. Other issue area assumptions are provided in each issue area analysis.

3.1.2 IMPACT SIGNIFICANCE

For each issue area, criteria of significance are established, based on normally accepted standards for environmental review and State CEQA guidelines. Impacts are individually numbered within each issue area and are classified as follows:

Significant, unavoidable: cannot be mitigated to a level that is less than significant;

Significant, mitigable: can be mitigated to a level that is less than significant;

Adverse (or less than significant): does not exceed the significance criteria or thresholds; or

Beneficial : a positive impact or effect, relative to the current environmental conditions.

For each impact that is classified as significant, mitigation measures are recommended. The effectiveness of recommended mitigation measures is assessed and the residual impact after mitigation is identified.

3.1.3 MITIGATION

A majority of capital improvements identified in the Expenditure Plan—which form the basis for all of the impacts that are significant—will be undertaken by other agencies; San Francisco County Transportation Authority (SFCTA) will be an agency through which portions of monies for the improvements will be distributed. Thus, where appropriate, mitigation measures identified later in this chapter establish actions that SFCTA would require of the project sponsors.

3.2 TRANSPORTATION

This section outlines current circulation conditions and examines effects of the proposed transportation improvements included in the proposed Expenditure Plan on future mobility in San Francisco, and the ability of proposed investments in transit, freeways, and local roadways to serve expected growth in travel demand.

3.2.1 SETTING

San Francisco has a multi-modal transportation system. The diversity of the transportation system is reflected in the many transit options available, including light rail, heavy rail, commuter rail, electric bus, diesel bus, cable car, ,and ferries. San Francisco's transportation system also offers extensive bicycle facilities, pedestrian sidewalks and stairways, and priority for high occupancy vehicles (through toll bypasses at the bridges).

Transportation Modes and Commute Patterns

According to the 2000 Census, San Franciscans use a variety of transportation modes to get to work sites, as demonstrated in Table 3.2-1. As this table shows, 31 percent of San Francisco residents use transit to get to and from work. This percentage is lower than in 1990, when 33 percent reported work trips in this category. The proportion of San Francisco workers that walked or carpooled also dropped from 1990. While the data does not specifically state the reasons, much is likely due to the changing commute patterns of San Francisco residents.

Table 3.2-1: San Francisco Resident Workers by Means of Transportation to Work, 1990 - 2000

Year	*Drive Alone*	*Carpool*	*Transit*	*Walk*	*Other (Bicycle, taxi, etc.)*	*Worked at Home*	*Workers*
1990	147,187	43,925	128,160	37,611	10,947	14,479	382,309
	38.5%	11.5%	33.5%	9.8%	2.9%	3.8%	100.0%
2000	169,508	45,152	130,311	39,192	15,014	19,376	418,553
	40.5%	10.8%	31.1%	9.4%	3.6%	4.6%	100.0%

Sources: U.S. Bureau of the Census, Decennial Censuses - 1990, 2000, Summary Tape File 3A (1990) and Demographic Profile 2, 3, 4 (2000).

San Franciscans are increasingly working in other counties. Table 3.2-2 shows that the overall number of employed San Francisco residents increased by almost 12 percent since 1990, and a larger increase in residents who work elsewhere occurred. Sizable growth in the percentage of San Francisco workers who work in San Mateo and Santa Clara Counties occurred. Overall, the proportion of San Francisco residents who commute to other counties in the 2000 Census is 22.5 percent, up from 19.2 percent in 1990.

Table 3.2-2: Estimated Commuting of San Francisco Residents, 1990 – 2000

	1990		*2000*		
County of Work	*Number*	*Percentage*	*Number*	*Percentage*	*% Change*[a]
San Francisco	299,926	80.8%	322,009	77.5%	7.4%
San Mateo	32,170	8.7%	43,306	10.4%	34.6%
Santa Clara	7,992	2.2%	15,868	3.8%	98.5%
Alameda	18,822	5.1%	20,834	5.0%	10.7%
Contra Costa	5,747	1.5%	4,568	1.1%	-20.5%
Solano	377	0.1%	418	0.1%	10.9%
Napa	117	0.0%	237	0.1%	102.6%
Sonoma	468	0.1%	835	0.2%	78.4%
Marin	5,006	1.3%	6,450	1.6%	28.8%
Elsewhere	784	0.2%	781	0.2%	-0.4%
TOTAL	371,409		415,306		11.8%

Note: "Elsewhere" is defined as Bay Area neighbor counties, including: Mendocino, Lake, Colusa, Yolo, Sacramento, Placer, San Joaquin, Stanislaus, Merced, San Benito, Monterey and Santa Cruz Counties.

[a] Change in raw numbers, not in percentages

Note: "TOTAL" is defined as the nine county Bay Area and the 12 neighbor counties.

Sources: 1990 and 2000 Census data was derived from "journey-to-work" datasets, prepared by staff of Metropolitan Transportation Commission (MTC).

Because San Francisco has many more jobs than employed residents, commute patterns of San Francisco workers are also important to examine. According to data presented in Table 3.2-3, San Francisco residents fill slightly more than half of San Francisco jobs (56 percent). San Mateo and Alameda counties are each home to about 12 percent of San Francisco workers. Contra Costa County contributes 9 percent and Marin County contributes 5 percent. Since 1990, the number of workers coming from San Mateo has decreased by about 7,000 workers, while the number of workers coming from Alameda has increased by about 12,000 workers.

Policy and Regulation

There are several federal and state frameworks that are used in developing the assumptions in the Expenditure Plan. These are described below.

The Transportation Equity Act for the 21st Century (TEA-21) was signed into federal law in 1998 and built upon the initiatives established in prior legislation for transportation funding and planning. TEA-21 reauthorized highway, highway safety, transit and other surface transportation programs for six years (1998-2003), and significantly increased overall funding for transportation. TEA-21 continued previous programs, including flexibility in the use of funds for a variety of locally defined purposes. TEA-21 also encouraged development of Intelligent Transportation Systems (ITS), to help improve operations and management of transportation systems and vehicle safety.

Table 3.2-3: Estimated Commuting to San Francisco Jobs, 1990 – 2000

County of Residence	*1990*		*2000*		
	Number	*Percentage*	*Number*	*Percentage*	*% Change*[a]
San Francisco	299,926	54.4%	322,009	55.6%	7.4%
San Mateo	78,832	14.3%	71,702	12.4%	-9.0%
Santa Clara	7,536	1.4%	7,946	1.4%	5.4%
Alameda	60,505	11.0%	72,035	12.4%	19.1%
Contra Costa	47,678	8.7%	49,525	8.5%	3.9%
Solano	9,805	1.8%	10,386	1.8%	5.9%
Napa	1,044	0.2%	1,305	0.2%	25.0%
Sonoma	8,357	1.5%	8,192	1.4%	-2.0%
Marin	33,656	6.1%	30,894	5.3%	-8.2%
Elsewhere	3,496	0.6%	5,359	0.9%	53.3%
TOTAL	550,835		579,353		5.2%

Note: "Elsewhere" is defined as Bay Area neighbor counties, including: Mendocino, Lake, Colusa, Yolo, Sacramento, Placer, San Joaquin, Stanislaus, Merced, San Benito, Monterey and Santa Cruz Counties.

[a] Change in raw numbers, not percentages

Note: "TOTAL" is defined as the nine county Bay Area and the 12 neighbor counties.

Sources: 1990 and 2000 Census data was derived from "journey-to-work" datasets, prepared by staff of Metropolitan Transportation Commission (MTC).

Under TEA-21, the U.S. Department of Transportation (USDOT) requires that Metropolitan Planning Organizations, such as the Metropolitan Transportation Commission (MTC), prepare long-range transportation plans and that these plans be routinely be updated. MTC last adopted a long range plan, known as the Regional Transportation Plan (RTP) in 2001. The RTP must meet several requirements, including planning for at least 20 years into the future, including a financially constrained element with reasonable revenue assumptions, and conforming to air quality plans and other Federal requirements.

In addition, the RTP must include projects before they can be funded within the State Implementation Improvement Program (STIP), as required by California Transportation Commission (CTC) procedures. This requirement is codified in federal Government Code 65080(c).

The Congestion Management Program (CMP) is another related requirement that is relevant to the Expenditure Plan. This program was established in 1989 as part of a bi-partisan state legislative package. The requirements for CMPs became effective when voters approved Proposition 111 on June 5, 1990. Changes were made to CMP requirements in 1994 and 1996. In 1997, the CMP was exempted from the California Environmental Quality Act. The legislation required each county that participates in the CMP process to assign a staff for that process; in San Francisco, the agency assigned with CMP responsibilities is the SFCTA.

The CMP must contain a number of efforts, including designating and monitoring of the regional multi-modal transportation system, monitoring of land use changes, providing a tool for analysis of impacts of local future transportation conditions, and preparing a capital improvements program for transportation projects. The CMP must be updated every two years.

The San Francisco General Plan also furthers various principles involved in transportation funding decisions. The City has a policy to "Give priority to public transit and other alternatives to the private automobile as the means of meeting San Francisco's transportation needs, particularly those of commuters", also known as the "transit first policy" (San Francisco General Plan, Transportation Element, Objective 1, Policy 3). Another policy in the General Plan states "the existing vehicular capacity of bridges, highways and freeways entering the city should not be increased and should be reduced where possible." (San Francisco General Plan, Transportation Element, Objective 3, Policy 1). These two policies are complemented by a range of other policies to discourage roadway expansion and focus transit and other alternative modes as the preferred method of addressing transportation issues.

Existing Circulation Conditions

As a significant result of a strong economy through the 1990s, San Francisco has experienced population and employment growth. This growth has resulted in increasing congestion, , in both vehicle and transit travel.

Roadways

San Francisco has an extensive roadway system. The system has constraints at the two toll bridges (Golden Gate and San Francisco-Oakland Bay Bridges) where travel demand is high at commute hours, as well as other hours during the weekends. About 270,000 vehicles cross the Bay Bridge, and 110,000 vehicles cross the Golden Gate Bridge each day. Other heavily used freeways that are "gateways" into San Francisco are US 101 and Interstate 280 from San Mateo County. Several other local roadways cross between San Francisco and San Mateo Counties.

San Francisco has only three facilities that are generally regarded as freeways. The western terminus of the cross-county Interstate 80 runs for about 4 miles in San Francisco. In addition, Interstate 280 runs about 7 miles in San Francisco from the Mission Bay area to the San Mateo County Line at Daly City. U.S. Highway 101 is built to freeway standards from the Mission Street/Van Ness Avenue ramps to the San Mateo County Line at Brisbane. The Central Freeway replacement currently programmed will result in this facility terminating at Market Street (crossing into a new arterial roadway – Octavia Boulevard) in 2006.

Most other San Francisco streets are generally constructed in grid patterns (see Figure 2-2). The grid system contains several one-way streets, particularly in the central core of the city. The one-way streets enable synchronized signal systems to be maintained, having the effect of smoothing out vehicle flows and improving safety for all road users. The central core of the city also has numerous restrictions on parking at peak traffic hours, so that additional travel lanes can be created.

San Francisco has established bus-only lanes on Market, Mission, Geary, O'Farrell and Post streets. Taxicabs and turning vehicles can also use these lanes.

As part of the compliance with the congestion management program requirements, SFCTA monitors the level of congestion on the roadway system as well as other multi-modal performance measures. The monitoring is based on travel time samples between two points on the corridor, which results in average travel speed data for roadway segments designated as part of the congestion management program network.

Transit

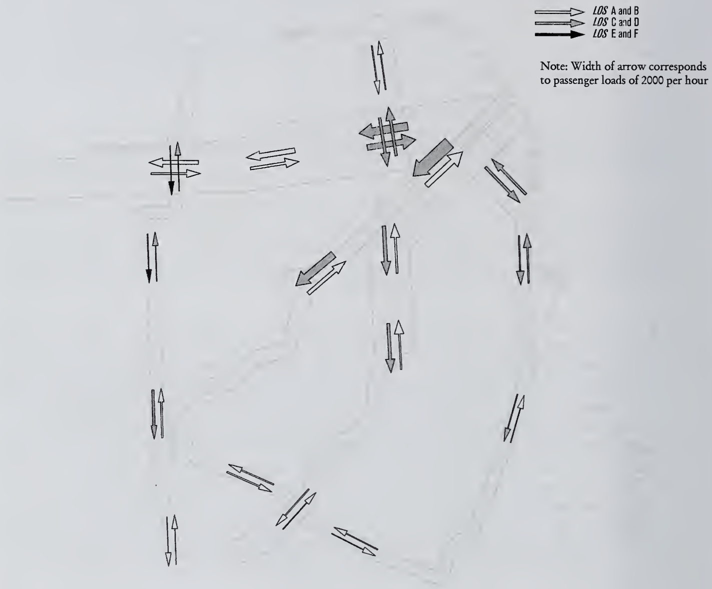
The transit system in San Francisco is complex, with several operators. A discussion of each of them is provided below.

San Francisco MUNI: The primary transit operator within San Francisco is the San Francisco Municipal Railway (MUNI). An agency of the City and County of San Francisco, Muni operates a network of buses, electric buses, light rail vehicles, historic trolley cars, and cable cars. MUNI maintains service seven days a week, and operates several routes 24 hours a day. MUNI estimated that 774,000 boardings each day occurred in 2000.

The impact of this heavily used system is that several bus routes often experience standing passengers at peak travel hours. Although standing passengers are acceptable to MUNI, buses cannot move quickly with standing passengers and some buses cannot take any more passengers because they are too crowded (at "crush" load). MUNI policy is that a bus is overcrowded when the load factor exceeds 100 to 180 percent, depending on the type of bus. The load factor is determined by dividing the number of riders by a measure that takes into account the number of seats as well as standing capacity.) While ridership loads vary between buses during peak periods, a general sense of bus overcrowding can be estimated by using a volume-to-capacity calculation with the San Francisco Travel Demand Model (SF-TDM) for 2000. A volume-to-capacity ratio of 1.0 would indicate buses operating at full capacity during the entire peak period, while a ratio of .25 would indicate many available seats and standing capacity on the buses. These volume-to-capacity ratios correspond to transit "level of service" categories A through F, where A represents the high seat/standing capacity availability, and F represents "crush" loads.

The SF-TDM results have been analyzed so that a generalized volume-to-capacity ratio for the entire period can be calculated and the most overcrowded corridors can be identified. It should be noted that these ratios are average conditions for a three-hour period; individual buses within this period will have higher ratios. The results for the P.M. peak period are shown in Figure 3.2-1, where the width of the arrows represent passenger loads and the colors indicate level of service (LOS), As Figure 3.2-1 indicates, the heaviest passenger demands most likely occurring in the Geary corridor outbound, in the Sunset/19th Avenue corridor in both directions, in MUNI Metro outbound, in the Mission corridor southbound, and on the Third Street corridor. Notably, the Park Presidio/Geary and 19th/Irving screenlines show LOS E/F due to the high ridership demands along this corridor.

Figure 3.2-1: 2000 Transit Volume/Capacity, PM Peak Period



Note: Width of arrow corresponds to passenger loads of 2000 per hour

Rail: Two regional rail operators serve San Francisco. The major operator is the Bay Area Rapid Transit District (BART). BART operates from 4:00 AM to 1:30 AM on weekdays, with weekend service available from 6:00 AM on Saturday and 8:00 AM on Sunday. The eight BART stations in San Francisco have approximately 311,000 boardings each weekday, according to BART ridership data.

The second rail operator, Caltrain, operates from 5:00 AM to 12:15 on weekdays, and experiences about 7,000 boardings in San Francisco each weekday, according to annual Caltrain surveys. (The service is temporarily inoperable during weekends as construction to allow for the "baby bullet" trains require suspending service during this period.)

Other major bus operators: Bus operators from other systems also take riders in and out of San Francisco. All three of these systems operate services seven days a week, but most services are permitted to carry travelers between two stops in San Francisco; they may only either pick-up or drop-off passengers going to/from other counties.

The three carriers are SamTrans (26,000 boardings), Golden Gate Transit (8,500 boardings), and AC Transit (11,000 boardings). SamTrans offers six commuter express routes and two intercity routes in San Francisco. SamTrans routes will be restructured upon opening of BART to Millbrae and San Francisco International Airport so that future year service and ridership will be less. Golden Gate Transit offers 5 basic (all-day) routes and 19 commuter routes into and out San Francisco, and service is operated between 5:00 AM and 2:20 AM. AC Transit offers 23 routes, with many of these routes having variations. Four AC Transit routes are operated on the weekends, and AC Transit offers some 24-hour service. Golden Gate Transit and AC Transit routinely modify the number and frequency of bus routes in and out of San Francisco based on ridership and budgetary considerations.

Ferries: Ferries connect San Francisco to destinations in Marin County (Sausalito, Tiburon, Larkspur), Solano County (Vallejo), and Alameda County (Alameda, Oakland). These ferries operate primarily at commute times, although some operators offer midday and weekend services for other travelers. According to the Water Transit Authority, there were less than 6,000 passengers on ferries that leave San Francisco each day in 2000.

Bicycles: San Francisco has an evolving bicycle network, which includes 34 miles of bicycle lanes and 29 miles of bicycle paths. In addition, there are 88 miles of signed bicycle routes and 54 miles of wide curb lanes. The 2000 Census found that about 7,500 workers that live in San Francisco use bicycles to get to work. Bicycles are also used for a variety of other short distance trip types.

Pedestrians: Pedestrian activity is often considered an unaccounted mode, although over 9 percent of San Franciscans actually walk to work. In addition, most transit riders are pedestrians for some portion of their work trip, and most persons who work or live in San Francisco are pedestrians on San Francisco sidewalks while making trips, regardless of the modes that they choose for work or other activities.

3.2.2 IMPACT ANALYSIS

Criteria For Significance

Following criteria are used to assess whether proposed transportation improvements in the Expenditure Plan will have a significant adverse effect on future regional mobility in the City/County:

- **Criterion 1:** Average travel time per trip. Implementation of the Project (Expenditure Plan) would have a potentially significant adverse impact if it results in an appreciable increase in average travel time per trip compared to the 2025 No Project (also referred to as 2025 Baseline). Although a particular mode could have a longer average travel time, the significance would be established if the average travel time change across modes would occur.
- **Criterion 2:** Vehicle hours traveled. Implementation of the Expenditure Plan would have an adverse impact if the overall vehicle hours traveled increased more than the 2025 No Project Alternative.
- **Criterion 3:** Number of work opportunities 30 minutes by auto and transit. Implementation of the Expenditure Plan would have a potentially significant adverse impact if it results in an appreciable decrease in the average number of jobs within specified travel times from home by auto (combines single occupant autos and carpools) and transit compared to the 2025 No Project Alternative.

Traffic Congestion. These measures are an appropriate representation of the impact of the Project on traffic congestion. The EIR evaluates the change in total vehicle trips (traffic) and changes in the amount of travel at different levels of service on freeways and local streets (congestion):

- **Criterion 4:** Vehicle miles traveled (VMT) at level of service (LOS) F. Implementation of the Expenditure Plan would have a potentially significant adverse impact if it results in an appreciable increase in vehicle miles traveled (VMT) at level of service (LOS) F compared to the 2025 No Project Alternative (LOS F defines a condition on roads where traffic substantially exceeds capacity, resulting in very low speeds and stop-and-go conditions for extended periods of time.)
- **Criterion 5:** Transit ridership. Implementation of the Expenditure Plan would have potentially significant adverse impact if it results in an appreciable decrease in transit ridership as compared to the 2025 No Project Alternative.

- **Criterion 6:** Transit volume-capacity ratio. Implementation of the Expenditure Plan would have potentially significant adverse impact if it results in a reduction in the level of service in the corridor to E or F.[1]

---

[1] Using transit volume-capacity ratios, a methodology for analyzing the level of congestion during a two-hour period has been developed by the Department of City Planning, referred to as the "Transit Level of Service".

Methodology and Assumptions

The transportation impact analysis is based on modeling and numerous assumptions about future conditions. In order to assess the impacts of the proposed Expenditure Plan on the existing transportation network, it is necessary to develop a future transportation scenario that is based on projected growth in the city and future employment trends. In addition, it is important to look at the future 2025 baseline conditions, without the proposed Expenditure Plan, as a means to determine the significance of the various transportation improvements and programs in the Plan in either improving or exacerbating current traffic flow conditions.

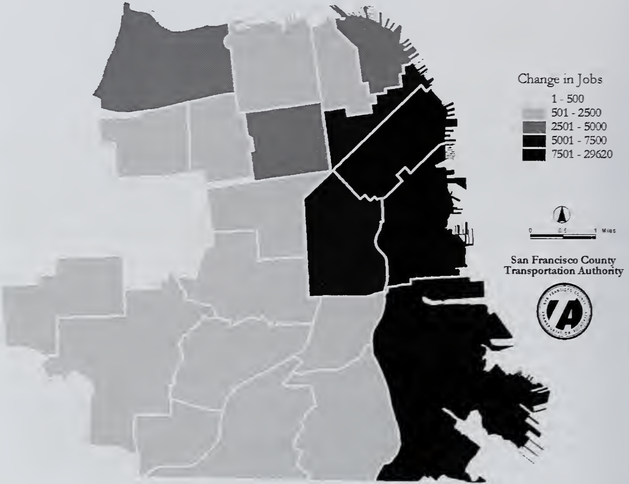
To examine future year conditions, the most reasonable horizon year available is 2025. This is the horizon year for the RTP, as well as for the Countywide Plan analysis. While the Expenditure Plan horizon is 2034, the year 2025 is the most reliable year that incorporates adopted regional plans and growth forecasts, and is thus the appropriate horizon for quantitative evaluation for all future scenarios. For years beyond 2025, a qualitative analysis is used to estimate future conditions.

Future Growth Patterns

As San Francisco grows, transportation problems will continue to develop. Not only will the City need to accommodate new residents and workers, but the existing system will still need extensive upkeep, including the need to acquire new transit vehicles and repave and rehabilitate streets.

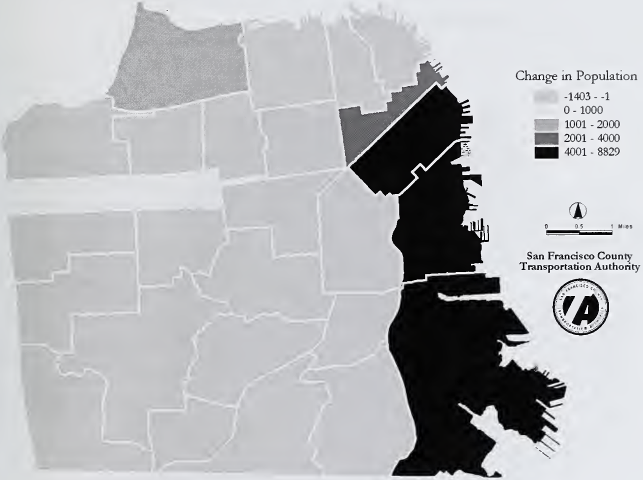
Significant growth in employment in the City between 2000 and 2025 is expected. MTC predicts over 110,000 new jobs will be created in San Francisco, growing from approximately 630,000 to 740,000. Figure 3.2-2 shows the growth in employment in 26 neighborhoods across the city. This figure demonstrates that, while all neighborhoods experience some growth in employment, the vast majority and intensity in employment growth is expected in the existing Downtown and South of Market core, around Mission Bay, in Bayview/Hunters Point, and in the Mission District.

Figure 3.2-2: Change in Jobs 2000 – 2025



Despite the significant growth in jobs, the population of San Francisco is not expected to increase much between 2000 and 2025. MTC's citywide projections indicate growth of approximately 6,000 new residents, just under one percent total growth over 25 years. However, this small growth is not evenly distributed across the city. Figure 3.2-3 shows that significant population increases are expected along the Bayshore corridor, and in South of Market, Downtown, and the Presidio. However, the population in the vast majority of neighborhoods is expected to actually decline.

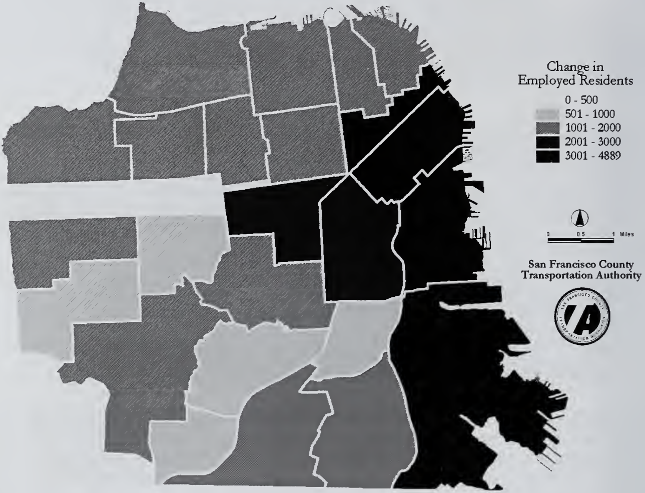
Figure 3.2-3: Change in Population 2000 – 2025



One of the most significant population shifts expected in San Francisco is the great increase in the number of employed San Francisco residents, relative to the insignificant growth in the total population. The number of employed San Francisco residents is expected to increase from 420,000 in 2000 to 463,000 in 2025, a gain of over ten percent. This means that a greater share of San Francisco residents will be workers, which has implications for the types of demand that will be placed upon the transportation system, as workers are likely to make more trips overall than non-workers, and often to travel during time periods when capacity is most constrained. Figure 3.2-4 illustrates where increases in employed residents are expected. All neighborhoods show increases in the number of employed residents, even those where the total population declined. However, the most significant increases in the number of employed residents are where the greatest overall increases in population are expected – in the Bayshore corridor, Downtown and South of Market. In addition, the Castro/Haight and Mission neighborhoods also are expected to experience notable increases in the number of employed residents.

The gain of 43,000 employed San Francisco residents is still significantly less than the overall increase of 110,000 jobs in SF, meaning that at least 67,000 workers will be coming to San Francisco to work, placing additional burdens on already constrained regional gateways.

Figure 3.2-4: Changed in Employed Residents 2000 – 2025


Change in Employed Residents
0 - 500
501 - 1000
1001 - 2000
2001 - 3000
3001 - 4889
0
0.5
1 Miles
San Francisco County Transportation Authority

The current Regional Transportation Plan and Countywide Plan efforts evaluate transportation conditions in 2025. As described above, the expiration of the proposed sales tax will not occur until a later year (2034), but the 2025 data is the most complete version of the adopted land use and transportation network available for analysis purposes (see discussion of this issue in Section 3.1).

As San Francisco grows, transportation problems will continue to develop. Not only will the City need to accommodate new residents and workers, but the existing system will still need extensive upkeep, including the need to acquire new transit vehicles and repave and rehabilitate streets.

The result of creating many more jobs than employed residents is expected to result in greater volume of in-bound commuters in 2025. With the current trend of more San Francisco residents leaving the City for work, the dependency of San Francisco on the regional transportation system will increase.

Prior to 1998, the only available tool to forecast the future traffic demand was the regional travel model maintained by the Metropolitan Transportation Commission (MTC) for the nine-county San Francisco Bay Area, which was not able to effectively forecast local street demands.

SFCTA developed a travel demand model—the San Francisco Travel Demand Model (SF-TDM),between 1998 and 2001 that was consistent with regional demand and specifically developed to deal with local conditions including traffic and transit patterns. The SF-TDM was approved by the SFCTA Board, acting as the congestion management agency, to project future traffic and transit volumes for projects in San Francisco, and is used for the analyses here.

SF-TDM uses TP+ software to simulate the daily movement of people within and through San Francisco. Several unique features allow for a variety of trip behaviors. For example, a customized travel path methodology accounts for San Francisco residents' tendency to "chain" several trips together. This path, called a "tour", provides a more accurate forecast of San Francisco residents' travel patterns. Customized equations also allow for allocating trips among the many different travel mode options, including transit.

To develop Year 2025 conditions, the SF-TDM incorporated the Projections 2000 series of demographic assumptions for the Bay Area, including out-of-county trips produced by MTC for the Draft 2001 Regional Transportation Plan, and the Draft Presidio Trust Implementation Plan proposed improvements and projects. These assumptions enable a project analysis that builds upon previously adopted land use growth and local transportation project assumptions in San Francisco and across the Bay Area.

Model Assumptions

To develop Year 2025 conditions, the SF-TDM incorporated the Projections 2000 series of demographic assumptions for the Bay Area, including out-of-county trips produced by MTC for the Draft 2001 Regional Transportation Plan, and the Draft Presidio Trust Implementation Plan proposed improvements and projects. These assumptions enable a project analysis that builds upon previously adopted land use growth and local transportation project assumptions in San Francisco and across the Bay Area.

Future 2025 (Baseline) Assumptions and the No Project Alternative: San Francisco already has a number of projects committed in the Congestion Management Program or in the MTC RTP funded categories. These include major projects and programs within and outside of San Francisco and formed the basis for the network used as the basis for San Francisco's committed program for the 2001 RTP update. This base 2025 network, plus enhancements that have been implemented since 2000, served as the analytical basis for the quantitative analysis of the No Project Alternative.

To assess and compare the No Project Alternative, it is necessary to determine future conditions without the proposed Expenditure Plan. As the MTC RTP horizon year is 2025, it is not possible to model specific projects/programs beyond that year. Since this EIR analyzes an Expenditure Plan with a horizon year of 2034, a qualitative assessment of the years 2025 to 2035 is made, based on some general assumptions as to what would likely occur under the No Project scenario during those years. Since the base year for the EIR modeling effort is 2000, some projects that were constructed since 2000 were added to the RTP network in order to construct the 2025 No Project Alternative. Similar to the assumption for the proposed Expenditure Plan, the analysis assumes that all major physical transportation improvements associated with the No Project Alternative would be completed by the year 2025. Continued maintenance and programmatic improvements would occur during 2025 – 2034, but at lower levels than the proposed project.

Expenditure Plan Alternative: Although the Expenditure Plan contains numerous projects and programs (detailed in Chapter 2), only a few can adequately be represented in the San Francisco Travel Model. Even in these cases, an approximation of the project particulars is often required. Until a project has been adequately studied and funded, a final design cannot be determined.

For this EIR, project assumptions were established that were the most likely to result in notable impacts to transit or vehicle performance, or a reasonable worst case scenario. For example, in some cases the model assumed that a traffic lane would be removed in the proposed project condition for transit corridor projects, although this may not be required upon final design.

Projects and improvements assumed in the 2025 No Project Alternative and Proposed Project Alternative are shown in **Appendix B: Comparison of Expenditure Plan and Alternatives.**

Impacts and Mitigation Measures

Impact 3.2-a: The Expenditure Plan would result in increase in average travel times for auto travel and decrease in average travel time for transit travel. (Less than significant.)

Travel time is a central measure of mobility since transportation improvements are generally intended to reduce travel times, particularly in highly congested corridors. Travel time for individuals are reported as average travel time per trip by mode. In addition, an aggregate measure, total vehicle hours traveled, also reflects travel time. This measure is also related to air pollution and energy consumption.

The SFCTA develops average travel time for San Francisco residents as a standard reporting item in the San Francisco Travel Demand Model. Travel time measurements are provided for aggregated vehicle (auto) and transit categories.

With the proposed Expenditure Plan, transit riders will experience a 24 second reduction when compared to the estimated 2000 conditions, while auto drivers are expected to need an additional 26 seconds in additional travel.

When compared to the 2025 Baseline (No Project), implementation of the proposed Expenditure Plan would result in a decrease of average travel time for internal San Francisco trips. The decrease is about 0.8 percent, or 8 seconds. The average travel time for auto drivers is anticipated to increase by about 0.2 percent or 2 seconds. This is offset by a reduction for an average transit rider by 4.9% or 98 seconds.

No significant impact is thus expected with the adoption and implementation of the proposed Expenditure Plan, because it will improve transit travel times compared with the No Project Alternative.

Table 3.2-4: Average Travel Time Comparison – Internal SF Trips Only

	2000	*2025*		*Percent Difference*		
Avg Travel Time	*Base*	*No Project*	*Exp Plan*	*No Project to 2000 Base*	*2025 Exp Plan to 2000 Base*	*2025 Exp Plan to No Project*
Transit	33.43	33.67	32.03	0.7%	-4.2%	-4.9%
Auto	10.86	11.27	11.30	3.8%	4.0%	0.2%

Source: SF-TDM, SFCTA, May 2003.

Mitigation Measures

No mitigation is required as this impact is less than significant.

Impact 3.2-b: The Expenditure Plan would result in reduction in vehicle hours traveled. (Beneficial)

Because San Francisco population and employment are projected to increase, the total number of vehicle trips generated within San Francisco is anticipated to grow by 6.0 percent between 2000 and 2025, with the Expenditure Plan. However, this increase in trips is not attributable to the Expenditure Plan itself. As shown in Table 3.2-4, implementation of the Expenditure Plan is anticipated to reduce vehicle trips by 1.4 percent, relative to the future baseline (2025 No Project) scenario.

As a result of the increase in vehicle trips, the amount of vehicle miles and vehicle hours traveled on San Francisco roadways will also increase. It is estimated that there will be an increase of 28.1 percent of vehicles hours traveled in 2025, assuming that the proposed Expenditure Plan is approved and implemented (see Table 3.2-5).

However, when compared to the future 2025 Baseline, adoption and implementation of the proposed Expenditure Plan will result in a slight reduction of vehicle hours traveled, largely because vehicle trips are projected to decrease 1.4 percent under the Expenditure Plan Alternative. The reduction is forecasted to be a drop of 0.7 percent or over 4,000 hours a day for San Francisco roadways. Thus, implementation of the Expenditure Plan will have a beneficial impact.

Table 3.2-5: Daily Vehicle Miles and Vehicle Hours Comparison – San Francisco Links

	2000	*2025*		*Percent Difference*		
Attribute	*Base*	*No Project*	*Exp Plan*	*No Project to 2000 Base*	*2025 Exp Plan to 2000 Base*	*2025 Exp Plan to No Project*
Total Daily Vehicle Trips	1,323,400	1,423,600	1,403,000	7.6%	6.0%	-1.4%
Daily Vehicle Miles of Travel	9,342,200	10,638,000	10,556,000	13.9%	13.0%	-0.8%
Daily Vehicle Hours of Travel	482,100	621,600	617,400	28.9%	28.1%	-0.7%

Source: SF-TDM, SFCTA, May 2003.

Impact 3.2-c: Implementation of the Expenditure Plan will result in decrease in vehicle miles traveled (VMT) at level of service (LOS) F. (beneficial)

By 2025, a substantial increase is expected for vehicles miles traveled at LOS F, without the proposed Expenditure Plan (see Table 3.2-6). Although the aggregate VMT is only projected to grow by 13 percent with the Expenditure Plan, the VMT on roadways with congestion (defined as Level of Service F) are anticipated to grow by 117 percent with the Expenditure Plan.

As much of this traffic is a result of forecast population and employment growth in San Francisco and throughout the Bay Area, the increase in VMT cannot be attributed to the proposed Expenditure Plan. In fact, implementation of the Expenditure Plan Project is expected to reduce overall VMT in San Francisco by 0.8 percent, and VMT at LOS F by about 2 percent, compared to the future baseline (2025 No Project). Thus, implementation of the Expenditure Plan will have a beneficial impact.

Table 3.2-6: VMT and VMT LOS Comparisons – San Francisco Links

	2000	*2025*		*Percent Difference*		
Measure	*Base*	*No Project*	*Exp Plan*	*2025 Base to 2000 Base*	*2025 Exp Plan to 2000 Base*	*2025 Exp Plan to 2025 Base*
VMT	9,342,200	10,638,000	10,556,000	13.9%	13.0%	-0.8%
VMT LOS F	920,900	2,039,400	2,002,500	121.4%	117.4%	-1.8%
% of VMT	9.9%	19.2%	19.0%	93.9%	91.9%	-1.0%

Source: SF-TDM, SFCTA, May 2003.

Impact 3.2-d: Implementation of the Expenditure Plan would increase number of work opportunities within 30 minutes by auto and transit. (beneficial)

Accessibility measures describe the effect of transportation improvements on general accessibility of San Francisco residents. Changes in accessibility measure how easy it is to get to different types of activities or opportunities around the region. Accessibility can be defined for personal travel as the ability to reach desired destinations such as jobs, shopping, or recreational opportunities.

Providing accessibility can be viewed as a fundamental objective for the transportation system, as it allows people to access desired activities.

Accessibility is determined by two key factors: transportation system performance and land use patterns. Transportation system performance can consider measures such as travel times, travel costs, and travel convenience. Land use patterns capture the spatial locations of desired activity destinations such as housing, jobs, and shopping opportunities.

There are many ways to quantify measures of accessibility. To support the development of the San Francisco Countywide Plan, the SFCTA developed a set of "isochrone" or "cumulative opportunity" measures to capture accessibility to various opportunities. For example, to capture overall access to jobs, the SFCTA summarized the average amount of employment available to workers traveling 30 minutes by auto and 30 minutes by transit during the AM peak.

Anticipated results are shown in Table 3.2-7. By 2025, there will be increased employment activity available as a result of new jobs and housing within San Francisco occurring in multi-use districts, such as the Third Street corridor and Mission Bay. The result is that there will be an increase in the number of jobs that San Franciscans can reach in 30 minutes. Implementation of the proposed Expenditure Plan, relative to the future baseline (2025 No Project) will result in slightly less accessibility (0.2 percent to all jobs; 0.5 percent to retail jobs) for drivers, but a significant improvement in accessibility (13.8 percent to all jobs; 19.6 to retail jobs) for transit users to these activities.

Taken together, these measures produce a beneficial effect of the Expenditure Plan Alternative, relative to the future 2025 No Project Alternative.

Table 3.2-7: Accessibility Comparisons – San Francisco Residents

	2000	*2025*		*Percent Difference*		
Accessibility Measure	*Base*	*No Project*	*Exp Plan*	*No Project to 2000 Base*	*2025 Exp Plan to 2000 Base*	*2025 Exp Plan to No Project*
Employment within 30 minutes by auto	569,900	625,800	624,800	9.8%	9.6%	-0.2%
Employment within 30 minutes by transit	239,600	282,000	320,900	17.7%	33.9%	13.8%

Source: SF-TDM, SFCTA, May 2003.

Impact 3.2-e: The Expenditure Plan will result in an increase in transit ridership. (Beneficial)

While transit travel time changes are analyzed in Impact 3.2-a, further analysis is needed to determine how transit would be affected as a result of the Expenditure Plan implementation. One measure evaluates whether the Expenditure Plan would reduce ridership, which would contradict the objective of promoting a "transit-first" policy.

In 2000, there were about 1.1 million daily transit boardings in San Francisco (Table 3.2-8). With the Expenditure Plan, this number is projected to rise to over 1.4 million daily transit boardings in 2025. While some of this increase is attributable to the opening of the BART extension to San Francisco International Airport and Millbrae, most is due to projected housing and job growth in San Francisco.

Transit boardings are forecast to be three percent greater than the 2025 No Project scenario, demonstrating that the Expenditure Plan should increase transit boardings in San Francisco. Thus, the Expenditure Plan will have a beneficial impact on transit boardings.

Table 3.2-8: Transit Boardings

	2000	*2025*		*Percent Difference*		
Operator	*Base*	*No Project*	*Exp Plan*	*No Project to 2000 Base*	*2025 Exp Plan to 2000 Base*	*2025 Exp Plan to No Project*
, compared to the future baseline (No Project)TOTAL	1,088,300	1,385,200	1,430,000	27.3%	31.4%	3.2%

Source: SF-TDM, SFCTA, May 2003.

Along with additional transit riders will come additional loads on buses. To analyze these impacts, a standard measure for Transit Level of Service was used, as described above in section 3.2.1. Existing Conditions. As shown in Figure 3.2-5, the transit loads are expected to increase between 2000 and 2025. The 2025 Base map shows little change in LOS systemwide compared with the existing conditions, although there will be significant growth along the 3rd Street corridor, and less pronounced growth along the Geary Boulevard corridor.

Figure 3.2-5: Expenditure Plan Transit Screenlines, 2025

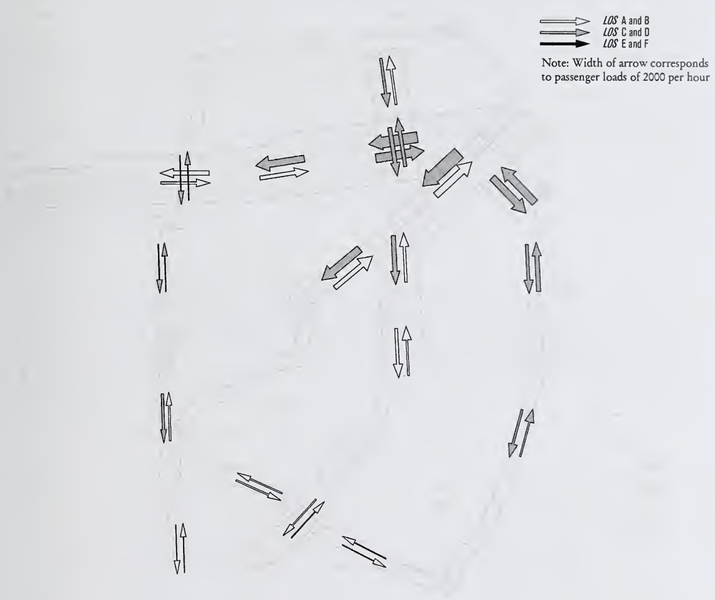
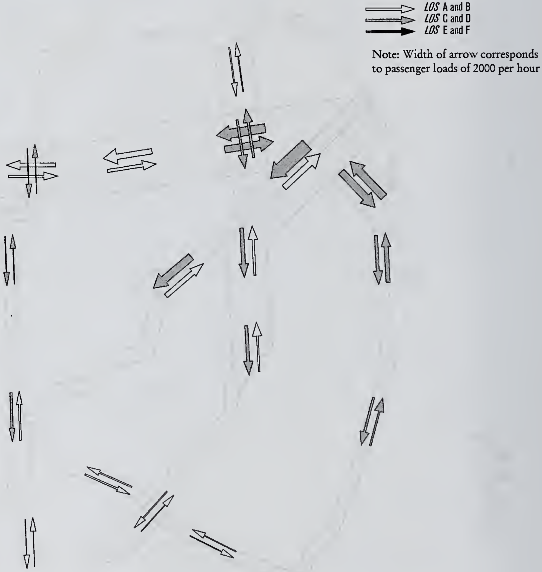

LOS A and B
LOS C and D
LOS E and F
Note: Width of arrow corresponds to passenger loads of 2000 per hour

Figure 3.2-6 shows level of service for screenlines in the 2025 Expenditure Plan Alternative. The 2025 Expenditure Plan map shows significant growth in ridership in the Geary corridor (wider arrows), and also shows that the westbound Geary/Arguello screenline drops from LOS B to C, due to increased ridership associated with the proposed BRT system. It also shows ridership growth in the Van Ness and Mission corridors, with a corresponding decline in LOS at the Lombard screenline and the 14th Street screenline respectively. This utilization of existing capacity is a good indication of the effectiveness of proposed investments. In no case does the Expenditure Plan Alternative result in LOS E or F; therefore there is no impact under Criterion 6: transit volume-to-capacity ratio.

Figure 3.2-6: Future Baseline Screenlines, 2025


LOS A and B
LOS C and D
LOS E and F
Note: Width of arrow corresponds to passenger loads of 2000 per hour

3.3 AIR QUALITY

This air quality analysis focuses on the criteria pollutants which affect public health and for which the Bay Area is currently designated as a non-attainment area for the national standards (ozone[1]) and state standards (ozone and particulate matter less than 10 microns [PM-10]). The analysis also discusses toxic air contaminants, which refers to pollutants that occur in relatively low concentrations and can have adverse health impacts, but for which no ambient air quality standards have been established. In both cases, the pollutants discussed are those that are produced by mobile sources-autos, buses, and trucks. Implementation of the proposed Expenditure Plan could affect these pollutants through changes in travel behavior and vehicle activity (amount of travel and speed). The main pollutants and impacts addressed in this chapter are regional in nature. Localized pollutants such as carbon monoxide are more appropriately addressed in project level environmental documents. However, it should be noted that new fuel requirements established by the California Air Resources Board (CARB) have all but eliminated carbon monoxide as an air quality problem.

3.3.1 SETTING

The study area includes the entire City and County of San Francisco, which is located within the boundaries of the San Francisco Bay Area Air Basin (Bay Area), as designated by CARB. Air quality problems are connected to health effects associated with certain types of pollutants. Automobiles, buses and ferries, and diesel powered rail systems all generate emissions, as does the generation of power for electric operated transit. This section provides a description of current air quality conditions in the study area.

Climate and Meteorology

The climate of the Bay Area is determined largely by a high-pressure system that is almost always present over the eastern Pacific Ocean off the West Coast of North America. High-pressure systems are characterized by an upper layer of dry air that warms as it descends, restricting the mobility of cooler marine-influenced air near the ground surface, and resulting in the formation of subsidence inversions. During summer and fall, emissions generated in the Bay Area can combine with abundant sunshine under the restraining influences of topography and subsidence inversions to create conditions that are conducive to the formation of photochemical pollutants, such as ozone, and secondary particulates, such as nitrates and sulfates. In the winter, the Pacific high-pressure system shifts southward, allowing storms to pass through the area.

Specifically, San Francisco is located at the northern end of the Peninsula climatological subregion of the Bay Area. Because most of San Francisco's topography is below 200 feet, marine air flows easily across most of the city, making its climate cool and windy. Temperatures in the San Francisco area average 58 degrees Fahrenheit annually, ranging from the mid-40s on winter mornings to the mid-70s in late summer afternoons. The strong onshore flow of wind in summer keeps cool air and frequent cloudiness over the Bay Area until September, when the offshore Pacific high-pressure center weakens and migrates southward. Warmest temperatures generally occur in September and October. Temperature extremes, reaching 90 degrees or dropping to freezing, are rare in San Francisco. Rainfall averages 21 inches per year and is confined primarily to the "wet" season from late October to early May. Except for occasional light drizzles from thick marine stratus clouds, summers are almost completely dry.

---

[1] In August 1998, the Bay Area was redesignated to non-attainment, unclassified for the national 1-hour ozone standard.

Winds in the San Francisco area display several characteristic regimes. Within San Francisco, winds are generally from the west and northwest, although wind patterns are often influenced by local topographic features. Winds from these directions carry pollutants released from San Francisco out over the Bay and into the East Bay.

Normally, air temperatures decrease with increasing elevations. Sometimes this normal pattern is inverted, with warmer air aloft, and cool air trapped near the earth's surface. This phenomenon occurs in all seasons. In summer, especially when wind speeds are very low, a strong inversion will trap air emissions and high levels of ozone smog can occur. In winter, a strong inversion can trap emissions of particulate and carbon monoxide near the surface, resulting in unhealthful air quality.

The pollution potential of an area is largely dependent on winds, atmospheric stability, solar radiation, and terrain. The combination of low wind speeds and low inversions produces the greatest concentration of air pollutants. On days without inversions, or on days of winds averaging over 15 miles per hour (mph), smog potential is greatly reduced. Because of wind patterns, and to a lesser degree the geographic location of emission sources, high ozone levels usually occur in inland valleys. High PM-10 levels can occur in most valley areas where residential wood smoke and other pollutants are trapped by inversions and stagnant air. Though pollutant emissions are high in San Francisco, winds are generally fast enough to carry the pollutants away before they can accumulate. However, localized pollutants like carbon monoxide can build up in "urban canyons".

Regulatory Context

Criteria Air Pollutants

Regulation of air pollution is achieved through both national and state ambient air quality standards and emissions limits for individual sources of air pollutants. The federal Clean Air Act Amendments of 1970 established national ambient air quality standards for criteria pollutants to protect public health and welfare. National standards have been established for ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide, particulate matter, and lead. These pollutants are called "criteria air pollutants" as they are more pervasive in the environment and standards have been established for each of them to meet specific public health and welfare criteria. Individual states were given the option to adopt more stringent state standards for criteria pollutants and to include other pollutants. California had already established its own air quality standards when federal standards were established, and because of the unique meteorological conditions and associated air quality problems in the state, there is considerable diversity between state and federal standards currently in effect in California, as shown in Table 3.3-1.

Amendments to the federal Clean Air Act require the U.S. Environmental Protection Agency (U.S. EPA) to classify air basins or portions thereof, as either "attainment" or "nonattainment" for each criteria pollutant, based on whether or not the national standards have been achieved. The California Clean Air Act (CCAA) passed by the State Legislature in 1988 also requires areas to be designated as "attainment" or "nonattainment" based on whether or not State standards have been achieved.

Therefore, areas in California have two sets of attainment/nonattainment designations: one for the federal standards and one for the State standards. Current attainment status is described in more detail in the section on Air Quality Plans, Policies, and Regulations (see below).

Under the federal Clean Air Act, jurisdictions with nonattainment areas are required to prepare air quality plans (State Implementation Plans or SIPs) that include strategies for achieving attainment. Similarly, the California Clean Air Act requires nonattainment jurisdictions to prepare air quality plans showing strategies for achieving attainment with respect to State standards.

Toxic Air Contaminants

Toxic Air Contaminants (TACs) are less pervasive in the urban atmosphere than criteria air pollutants, but are linked to short-term (acute) or long-term (chronic and/or carcinogenic) adverse human health effects. There are hundreds of different toxic air contaminants, with varying degrees of toxicity. Sources of toxic air contaminants include industrial processes, commercial operations (e.g., gasoline stations and dry cleaners), and motor vehicle exhaust. Unlike regulations concerning criteria air pollutants, there are no standards for evaluation of toxic air contaminants based on the amount of emissions. Instead, emissions of toxic air contaminants are evaluated based on the degree of health risk that could result from exposure to these pollutants.

TACs are regulated under the 1977 federal Clean Air Act Amendments. The most recent federal Clean Air Act Amendments (1990) reflect a technology-based approach for reducing toxic air contaminants. The first phase involves requiring facilities to install Maximum Achievable Control Technology (MACT). The MACT standards vary depending on the type of emitting source. U.S. EPA has established MACT standards for more than 57 facilities or activities, such as perchloroethylene dry cleaning and petroleum refineries, as of the end of year 1999. The second phase of control involves determining the residual health risk represented by air toxics emissions sources after implementation of MACT standards.

Two principal laws provide the foundation for State regulation of toxic air contaminants from stationary sources. In 1983, the State Legislature adopted Assembly Bill 1807, which established a process for identifying TACs and provided the authority for developing retrofit air toxics control measures on a statewide basis. The current list of TACs includes approximately 200 compounds,

Table 3.3-1: Ambient Air Quality Standards and Bay Area Attainment Status

Pollutant	*Averaging Time*	*State Standard*	*Bay Area Attainment Status for California Standard*	*Federal Primary Standard*	*Bay Area Attainment Status for Federal Standard*	*Major Pollutant Sources*
Ozone	8 hour	---	---	0.08 ppm	Unclassified	Motor vehicles,
	1 hour	0.09 ppm	Non-Attainment	0.12 ppm	Non-Attainment	Other mobile sources, combustion, industrial and commercial processes
Carbon Monoxide	8 hour	9.0 ppm	Attainment	9 ppm	Attainment	Internal combustion engines, primarily gasoline-powered motor vehicles
	1 Hour	20 ppm	Attainment	35 ppm	Attainment	
Nitrogen Dioxide	Annual Average	---	---	0.053 ppm	Attainment	Motor vehicles, petroleum refining operations, industrial sources, aircraft, ships, and railroads
	1 Hour	0.25 ppm	Attainment	---	---	
Sulfur Dioxide	Annual Average	---	---	0.03 ppm	Attainment	Fuel combustion, chemical plants, sulfur recovery plants and metal processing
	24 Hour	0.04 ppm	Attainment	0.14 ppm	Attainment	
	1 Hour	0.25 ppm	Attainment	---	---	
Particulate Matter (PM-10)	Annual Arithmetic Mean	20 µg/m3	Non-Attainment	50 µg/m3	Attainment	Dust- and fume-producing industrial and agricultural operations, combustion, atmospheric photochemical reactions, and natural activities (e.g., wind-raised dust and ocean sprays)
	24 hour	50 µg/m3	Non-Attainment	150 µg/m3	Unclassified	
Particulate Matter (PM2.5)	Annual Arithmetic Mean	12 µg/m3	Non-Attainment	15 µg/m3	Unclassified	Same as above
	24 hour	---	---	65 µg/m3	Unclassified	
Lead	Calendar Quarter	---	---	1.5 µg/m3	Attainment	Lead smelters, battery manufacturing & recycling facilities
	30 Day Average	1.5 µg/m3	Attainment	---	---	

Note: ppm = parts per million; and µg/m3 = micrograms per cubic meter

Source: Bay Area Air Quality Management District, 2003; South Coast Air Quality Management District, 1997 Air Quality Management Plan, November 1996.

including all of the toxics identified under federal law plus additional compounds, such as particulate emissions from diesel-fueled engines, which was added in 1998. Air toxics from stationary sources in California are also regulated under Assembly Bill 2588, the Air Toxics "Hot Spots" Information and Assessment Act of 1987. Under Assembly Bill 2588, TAC emissions from individual facilities are quantified and prioritized by the local air districts. High priority facilities are required to perform a health risk assessment, and if specific thresholds are violated, they are required to communicate the results to the public in the form of notices and public meetings. Depending on the risk level, emitting facilities can be required to implement varying levels of risk reduction measures. Risk assessments are not required for mobile sources, such as marine diesel engines.

Regulatory Agencies

U.S. EPA is responsible for establishing and reviewing the national ambient air quality standards and judging the adequacy of SIPs, as well as implementing other programs authorized under the federal Clean Air Act. U.S. EPA has delegated the authority to implement many of the federal programs to the states while retaining an oversight role to ensure that the programs continue to be implemented.

CARB, the State's air quality management agency, is responsible for establishing and reviewing the State ambient air quality standards, compiling the California SIP and securing approval of that plan from U.S. EPA, and identifying TACs. CARB also oversees the activities of air quality management districts, which are organized at the county or regional level. As a general matter, U.S. EPA and CARB regulate emissions from mobile sources, and the regional air districts regulate emissions from stationary sources associated with industrial and commercial activities. The Bay Area Air Quality Management District (BAAQMD) is the regulatory agency with jurisdiction over the entire Bay Area, which includes all of San Francisco, San Mateo, Santa Clara, Alameda, Contra Costa, Marin, Napa counties and the southern half of Sonoma and southwestern half of Solano counties.

Air Quality Plans, Policies and Regulations

Attainment Designations

The Bay Area is currently designated "nonattainment" for State and national ozone standards and for the State PM-10 standard (CARB, 2001). These standards are shown in Table 3.3-1, above. Urbanized areas within the Bay Area are also designated as a "maintenance" area for the national carbon monoxide standard. The "maintenance" designation denotes that the area that is now designated as "attainment" had once been designated as "nonattainment." The Bay Area is in "attainment" or is "unclassified" for all other ambient air quality standards.

In July 1997, U.S. EPA revised the national ozone standard from the one-hour standard noted above to a new eight-hour standard of 0.08 parts per million (ppm). The Bay Area has not yet been classified with respect to this standard. In July 1997, EPA also revised the primary and secondary standards for particulate matter by establishing a new annual and 24-hour PM-2.5 (very small particles less than 2.5 microns) and by changing the form of the existing 24-hour PM-10 standard. In addition, the existing annual PM-10 standard was retained. Legal challenges to the proposed particulate standards delayed the designation of nonattainment areas and the preparation of attainment plans. However, as of January 2003, the Bay Area has been designated as "nonattainment" with respect to the new federal PM-2.5 standard. In response to this designation, the BAAQMD is initiating efforts to prepare a federal PM-10 attainment plan. Table 3.3-1 above also summarizes the attainment status of the Bay Area, with respect to the state and national ambient air quality standards.

Plans and Policies

As noted above, the federal Clean Air Act and the California Clean Air Act require plans (SIPs) to be developed for nonattainment areas (with the exception of areas designated as nonattainment for the State PM-10 standard). Plans are also required under federal law for areas designated as "maintenance" for national standards. Currently, there are three plans for the Bay Area:

1. Bay Area 2001 Ozone Attainment Plan for the One-Hour National Ozone Standard (Association of Bay Area Governments (ABAG), 2001), developed to meet federal ozone air quality planning requirements;
2. Bay Area 2000 Clean Air Plan (BAAQMD, 2000), the most recent triennial update of the 1991 Clean Air Plan, developed to meet planning requirements related to the state ozone standard; and
3. Carbon Monoxide Maintenance Plan (ABAG, 1994), developed to ensure continued attainment of the national carbon monoxide standard.

Federal Planning Requirements

U.S. EPA's redesignation of the Bay Area as an ozone nonattainment (unclassified) area for the 1-hour national ozone standard in 1998 required that the Bay Area demonstrate compliance with the current (0.12 ppm) national 1-hour ozone standard by November 15, 2000. The three regional agencies (which serve as "co-lead" agencies for federal air quality planning purposes)—BAAQMD, ABAG, and MTC—were required to adopt actions and control strategies to achieve compliance.

The three regional agencies submitted the new San Francisco Bay Area Ozone Attainment Plan for the 1-Hour National Ozone Standard to the U.S. EPA in June 1999. However, following the Bay Area's failure to attain the national ozone standard and U.S. EPA's consequent disapproval of elements of the Bay Area's 1999 Ozone Attainment Plan and finding of failure to attain the national ambient air quality standard for ozone, the three regional agencies prepared the Bay Area 2001 Ozone Attainment Plan, which is a proposed revision to the Bay Area portion of California's plan to achieve the national ozone standard. Though the 2001 Plan has been adopted by the boards of the three agencies and approved by the CARB in November 2001, it is still pending approval from the U.S. EPA as a revision to the California SIP. This Plan amends and supplements the 1999 Plan and predicts attainment of the national ozone standard by 2006.

The 2001 Plan includes five new Transportation Control Measures (TCMs), in addition to a set of 28 TCMs intended to reduce emissions from on road vehicles that are included as commitments in prior air quality plans. Of the 28 federal TCMs, 12 date from the 1992 Bay Area Air Quality Plan and 16 contingency TCMs were added by court order in 1991 pursuant to litigation over the 1982 Plan. The 16 contingency TCMs were adopted to make up the shortfall in emission reductions from TCMs 1 through 12, as calculated in 1987. Also, the 2001 Plan identifies several measures for further study. Table 3.3-2 lists the TCMs carried forward since the 1982 Plan and Table 3.3-3 lists the five proposed TCMs and Transportation-related Further Study Measures included in the 2001 Plan.

Table 3.3-2: Transportation Control Measures in the State Implementation Plan

TCM	*Description*
TCMs since the 1982 Plan	
TCM 1	Reaffirm Commitment to 28 percent Transit Ridership Increase Between 1978 and 1983
TCM 2	Support Post-1983 Improvements in the Operators' Five-Year Plans and, After Consultation with the Operators, Adopt Ridership Increase Target for the Period 1983 through 1987
TCM 3	Seek to Expand and Improve Public Transit Beyond Committed Levels
TCM 4	High Occupancy Vehicle (HOV) Lanes and Ramp Metering
TCM 5	Support RIDES Efforts
TCM 6[a]	Continue Efforts to Obtain Funding to Support Long Range Transit Improvements
TCM 7	Preferential Parking
TCM 8	Shared Use Park and Ride Lots
TCM 9	Expand Commute Alternatives Program
TCM 10	Information Program for Local Governments
TCM 11[b]	Gasoline Conservation Awareness Program (GasCAP)
TCM 12[b]	Santa Clara County Commuter Transportation Program
Contingency Plan TCMs	
TCM 13	Increase Bridge Tolls to $1.00 on All Bridges
TCM 14	Bay Bridge Surcharge of $1.00
TCM 15	Increase State Gas Tax by 9 Cents
TCM 16[a]	Implement MTC Resolution 1876, Revised — New Rail Starts
TCM 17	Continue Post-Earthquake Transit Services
TCM 18	Sacramento-Bay Area Amtrak Service
TCM 19	Upgrade Caltrain Service
TCM 20	Regional HOV System Plan
TCM 21	Regional Transit Coordination
TCM 22	Expand Regional Transit Connection Ticket Distribution
TCM 23	Employer Audits
TCM 24	Expand Signal Timing Program to New Cities
TCM 25	Maintain Existing Signal Timing Programs
TCM 26	Incident Management on Bay Area Freeways
TCM 27	Update MTC Guidance on Development of Local TSM Programs
TCM 28	Local Transportation Systems Management (TSM) Initiatives

[a] Proposed for deletion from ozone plan

[b] Proposed for deletion from ozone plan, but not carbon monoxide maintenance plan.

Source: Bay Area Air Quality Management District, 2001; MTC, 2001.

Table 3.3--3: Proposed Transportation Control Measures in 2001 Ozone Attainment Plan

TCM #	*Control Measure Description*
TCM A	Regional Express Bus Program
TCM B	Bicycle/ Pedestrian Program
TCM C	Transportation for Livable Communities (TLC)/Housing Incentive Program
TCM D	Additional Freeway Service Patrol
TCM E	Transit Access to Airports
Further Study Measures	
FS 1	Study Potential for Accelerating Particulate Trap Retrofit Program for Urban Buses
FS 2	Update MTC High Occupancy Vehicle (HOV) Lane Master Plan
FS 3	Study Air Quality Effects of High Speed Freeway Travel
FS 4	Evaluate Parking Charge Incentive Program
FS 5	Enhanced Housing Incentive Program/Station Access Program
FS 6	Further Smog Check Program Improvements
FS 7	Parking Cash Out Pilot Program

Source: Bay Area Air Quality Management District and Metropolitan Transportation Commission (MTC), 2001.

Federal Transportation Conformity Requirements

Under U.S. EPA rules and regulations, the proposed Expenditure Plan is subject to an air quality "conformity" analysis. An air quality conformity analysis tests carbon monoxide (CO) and ozone precursor emissions from the Expenditure Plan against conformity "budgets" as defined in U.S. EPA-approved CO and ozone attainment plans. SFCTA and project sponsors cannot implement certain transportation projects unless they come from an approved and conformed transportation plan. The purpose of conformity is to ensure that the Expenditure Plan helps achieve and maintain federal ozone and CO standards. For CO, the CO budget is identified in the 1994 Maintenance Plan. For the ozone precursor emissions ROG and NOX, the applicable emission budgets are contained in the new 2001 Ozone Attainment Plan. The analysis in this EIR is intended to demonstrate compliance with CEQA and is not an air quality conformity analysis.

State Planning Requirements

Under the CCAA, the BAAQMD is required to prepare a Clean Air Plan (CAP) to achieve state standards for ozone. The Act requires air districts to adopt, implement, and enforce TCMs. The 2000 CAP, which has been prepared to satisfy this requirement contains specific measures intended to improve air quality through tighter industry controls, cleaner cars and trucks, cleaner fuels, and increased commute alternatives, including transportation control measures designed to reduce the contribution of the automobile, the single most important contributor to degraded air quality. The CAP encourages cities and counties to adopt measures to support this goal. Any project that attracts automobile traffic may be found to have a significant air quality impact, according to BAAQMD, if the project's traffic generation has not been properly anticipated in the regional air quality plan. The 2000 CAP's TCM plan contains 19 measures, as shown in Table 3.3-4.

Table 3.3-4: Transportation Control Measures in the Clean Air Plan

TCM 1: Support Voluntary Employer Based Trip Reduction Programs
TCM 2: Adopt Employer-Based Trip Reduction Rule (DELETED)
TCM 3: Improve Areawide Transit Service
TCM 4: Improve Regional Rail Service
TCM 5: Improve Access to Rail and Ferries
TCM 6: Improve Interregional Rail Service
TCM 7: Improve Ferry Service
TCM 8: Construct Carpool/Express Bus lanes on Freeways
TCM 9: Improve Bicycle Access and Facilities
TCM 10: Youth Transportation (includes Clean Fuel School Buses)
TCM 11: Install Freeway/ Arterial Metro Traffic Operations System
TCM 12: Improve Arterial Traffic Management
TCM 13: Transit Use Incentives
TCM 14: Improve Rideshare/Vanpool Services and Incentives
TCM 15: Local Clean Air Plans, Policies and Programs
TCM 16: Intermittent Control Measure/Public Education
TCM 17: Conduct Demonstration Projects
TCM 18: Transportation Pricing Reform
TCM 19: Advocate Planning and Design of Projects to Facilitate Pedestrian Travel
TCM 20: Promote Traffic Calming

Source: Bay Area Air Quality Management District, 2000.

The CAP must be updated every three years, and was last revised in December 2000. At this time, no major metropolitan area in the state complies with the state ozone standard. The CCAA of 1988 requires a reduction in district wide emissions of five percent per year for each non-attainment pollutant or its precursors. If a district is unable to achieve this reduction, it allows, as an alternative strategy, the implementation of all feasible measures on an expeditious schedule. The Bay Area has proceeded under the latter requirement. The CCAA states that attainment plans should emphasize reducing emissions from transportation and area wide sources. The Bay Area attained the state carbon monoxide (CO) standard in 1993, so the CCAA planning requirements for CO nonattainment areas no longer apply to the Bay Area.

The Bay Area does not attain the state PM-10 standards, which are much stricter than the national PM-10 standards. However, at this time the CCAA does not include any planning requirements for PM-10 non-attainment areas, so no attainment plan has been developed for this pollutant. Table 3.3-1 outlines the national and California ambient air quality standards and the Bay Area attainment status for ozone, carbon monoxide, and PM-10.

Existing Air Quality in San Francisco

The BAAQMD operates a regional monitoring network that measures the ambient concentrations of the six criteria air pollutants: ozone, carbon monoxide (CO), respirable PM-10, lead, nitrogen dioxide, and sulfur dioxide. Monitored ambient air pollutant concentrations reflect the number and strength of emission sources and the influence of topographical and meteorological factors. Existing and probable future levels of air quality in San Francisco can be generally inferred from ambient air quality measurements conducted by the BAAQMD at its two San Francisco monitoring stations. The Potrero Hill station at 16th and Arkansas Streets measures all criteria pollutants, including regional pollution levels (ozone), as well as primary vehicular emission levels near busy roadways (CO). The station at 939 Ellis Street (between Van Ness and Franklin) at BAAQMD headquarters measures only carbon monoxide. Table 3.3-5 summarizes published data for the past five years (1998 to 2002) from these monitoring stations.

Ozone

Ozone is a respiratory irritant and an oxidant that increases susceptibility to respiratory infections and can cause substantial damage to vegetation and other materials. Ozone is not emitted directly into the atmosphere, but is a secondary air pollutant produced in the atmosphere through a complex series of photochemical reactions involving reactive organic gases (ROG) and nitrogen oxides (NOx). ROG and NOx are known as precursor compounds for ozone, so the emissions of these two pollutants are a concern. Significant ozone production generally requires ozone precursors to be present in a stable atmosphere with strong sunlight for approximately three hours. Ozone is a regional air pollutant because it is not emitted directly by sources, but is formed downwind of sources of ROG and NOx under the influence of wind and sunlight. Ozone concentrations tend to be higher in the late spring, summer, and fall, when the long sunny days combine with regional subsidence inversions to create conditions conducive to the formation and accumulation of secondary photochemical compounds, like ozone.

Peak ozone values in San Francisco declined in the mid-1990s but have started to climb again (Table 3.3-5). There have been no exceedances of the state or national ozone standard in San Francisco over the past five years.

Because ozone is a regional pollutant and precursors can travel long distances before they react to form ozone, project emissions of ROG and NOx would probably contribute to regional ozone levels as they are transported inland (wind generally blows from the coast toward inland valleys in summer). Table 3.3-6 presents ozone data summaries for the past ten years for the BAAQMD's entire regional network of monitoring stations. As shown in Table 3.3-6, the regional monitoring network has recorded exceedances of the state ozone standard on an average of approximately 20 days per year over the past ten years, with 1996 being the worst year at 34 exceedances, and 1997 being the best year with only 8 exceedances. Coastal monitoring stations, such as those in San Francisco, Oakland and San Rafael record the fewest exceedances, while inland valley stations, such as those in Livermore, Concord, and Gilroy, record the most violations. Exceedances of the national one-hour and national eight-hour ozone standards in the Bay Area occur less frequently than violations of State standards.

Table 3.3-5: Summary of Monitoring Data for the Arkansas Street and Ellis Street Stations in San Francisco, 1998 - 2002

Pollutant	*State Standard*	*National Standard*	*Pollutant Concentration by Year*[a]				
			1998	*1999*	*2000*	*2001*	*2002*
Ozone							
Highest 1-hour average, ppm[b]	0.09	0.12	0.05	0.08	0.06	0.08	0.05
Days over State Standard			0	0	0	0	0
Days over National Standard			0	0	0	0	0
Highest 8-hour average, ppm	NA	0.08	0.05	0.06	0.04	0.05	0.05
Days over National Standard			0	0	0	0	0
Carbon Monoxide (Arkansas Street)							
Highest 8-hour average, ppm	9.0	9	4.0	3.7	3.2	3.3	2.6
Days over Standard			0	0	0	0	0
Carbon Monoxide (Ellis Street)							
Highest 8-hour average, ppm	9.0	9	3.7	4.6	2.9	3.2	2.2
Days over Standard			0	0	0	0	0
Respirable Particulate Matter (PM-10)							
Highest 24-hour average, μg/m3[b]	50	150	52.4	77.9	63.2	67.4	49.7
Number of samples c			59	61	60	60	48
Days over State Standard (Measured)[c]			1	6	2	7	0
Days over State Standard (Calculated)[c]			6	36	12	36	0
Days over National Standard			0	0	0	0	0
Annual average, μg/m3	30	50	20	22	21	22	21

NOTE: Bold values are in excess of applicable standard.

[a] Data was collected at the Arkansas Street monitoring station unless otherwise noted. The Ellis Street station monitors for carbon monoxide only.

[b] ppm = parts per million; ?g/m3 = micrograms per cubic meter.

[c] PM-10 is not measured every day of the year. The term, "number of samples" refers to the number of 24-hour-average PM-10 samples collected in a given year at the Arkansas Street monitoring station.

SOURCE: California Air Resources Board, Summary of Air Quality Data, Gaseous and Particulate Pollutants, 1998, 1999, 2000, 2001 and 2002; www.arb.ca.gov/adam.

Table 3.3-6: Ozone Data Summaries for the San Francisco Bay Area Air Basin, 1991–2001

Year	*Number of Days Standard Exceeded*			*Ozone Concentrations in ppm*[a]				
				1 Hour		*8 Hour*		
	State 1 hr	*Federal 1 hr*	*Federal 8 hr*	*Max 1 hr*	*3 Year 4th High*[b]	*EPDC*[b]	*Max 8 hr*	*3 Year Avg. 4th High*[b]
2001	15	1	7	0.13	0.13	0.122	0.102	0.082
2000	12	3	4	0.15	0.14	0.143	0.114	0.087
1999	20	3	9	0.16	0.14	0.144	0.122	0.086
1998	29	8	16	0.15	0.14	0.151	0.111	0.089
1997	8	0	0	0.11	0.14	0.149	0.084	0.090
1996	34	8	14	0.14	0.14	0.151	0.112	0.093
1995	28	11	18	0.16	0.14	0.135	0.115	0.087
1994	13	2	4	0.13	0.12	0.118	0.097	0.082
1993	19	3	5	0.13	0.12	0.126	0.112	0.081
1992	23	2	6	0.13	0.12	0.130	0.101	0.082
1991	23	2	6	0.14	0.13	0.129	0.108	0.084

[a] ppm = parts per million.

[b] The 3 year 4th high, 3 year average 4th high and Expected Peak Day Concentration (EPDC) are calculated based on the data for 3 successive years, listed by the last year of the three year period. This data is used to track ozone trends and is important to demonstrate attainment in the SIP. The EPDC represents the ozone concentration expected to occur once per year. Data for the years 1999 and 2000 are not yet available.

NA = Not Applicable or Not Available

SOURCE: California Air Resources Board web site at www.arb.ca.gov. March, 2003.

Carbon Monoxide

Carbon monoxide is a non-reactive pollutant that is a product of incomplete combustion and is mostly associated with motor vehicle traffic. High carbon monoxide concentrations develop primarily during winter when periods of light winds combine with the formation of ground level temperature inversions (typically from the evening through early morning). These conditions result in reduced dispersion of vehicle emissions. Motor vehicles also exhibit increased carbon monoxide emission rates at low air temperatures. When inhaled at high concentrations, carbon monoxide combines with hemoglobin in the blood and reduces the oxygen-carrying capacity of the blood. This results in reduced oxygen reaching the brain, heart, and other body tissues. This condition is especially critical for people with cardiovascular diseases, chronic lung disease, or anemia.

Table 3.3-5 shows that exceedances of ambient carbon monoxide standards have not occurred at the Arkansas Street station and the Ellis Street station areas in the last five years. On-road motor vehicles are responsible for approximately 70 percent of the carbon monoxide emitted within San Francisco (California Air Resources Board, 2003). Carbon monoxide emissions are expected to decrease within the City by approximately 35 percent between 2001 and 2010 due to attrition of older, high polluting vehicles, improvements in the overall automobile fleet, and improved fuel mixtures.

Particulate Matter

PM-10 and PM-2.5 consist of particulate matter that is 10 microns (a micron is one-millionth of a meter) or less in diameter and 2.5 microns or less in diameter, respectively. PM-10 and PM-2.5 represent fractions of particulate matter that can be inhaled into the air passages and the lungs and can cause adverse health effects. Particulate matter in the atmosphere results from many kinds of dust- and fume-producing industrial and agricultural operations, fuel combustion, and atmospheric photochemical reactions. Some sources of particulate matter, such as demolition and construction activities, are more local in nature, while others, such as vehicular traffic, have a more regional effect. Very small particles of certain substances (e.g., sulfates and nitrates) can cause lung damage directly, or can contain adsorbed gases (e.g., chlorides or ammonium) that may be injurious to health. Particulates also can damage materials and reduce visibility.

Based on the data in Table 3.3-5, PM-10 concentrations measured in San Francisco show occasional violations of the state 24-hour-average standard approximately 5 percent of the time, which is equivalent to approximately 18 days per year. However, maximum PM-10 levels have declined over the five-year period shown in Table 3.3-5. Local exceedances of State PM-10 standards in San Francisco have been largely due to emissions from within the city. The primary sources of PM-10 in the city are construction and demolition activities, combustion of fuels for heating, industrial emissions, and vehicle travel over paved roads (BAAQMD, 1999). In general, particulate levels are relatively low near the coast, increase with distance from the coast, and peak in dry, sheltered valleys. Direct PM-10 emissions in San Francisco are expected to increase by approximately 8 percent between 2001 and 2010 due to an anticipated increase in the vehicle miles traveled (ARB, 2003).

Comparison of the air quality data with data from other BAAQMD monitoring stations indicates that San Francisco's air quality is among the least degraded of all developed portions of the Bay Area. Three of San Francisco's four prevailing wind directions, west, northwest, and west-northwest, blow from the Pacific Ocean, reducing the potential for San Francisco to receive air pollutants from elsewhere in the region.

Sensitive Receptors

The ambient air quality standards incorporate a margin of safety and are designed to protect those segments of the public most susceptible to respiratory distress. These people, known as sensitive receptors, include asthmatics, the very young, the elderly, people weak from other illness or disease, or persons engaged in strenuous work or exercise. Healthy adults can tolerate occasional exposure to air pollution levels somewhat above the ambient air quality standards before adverse health effects are observed.

3.3.2 IMPACT ANALYSIS

Criteria of Significance

According to the State CEQA Guidelines, significant impacts to air quality would occur if the plan would: conflict with or obstruct implementation of the applicable air quality attainment plan; violate any air quality standard or contribute to an existing or projected air quality violation; or result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors). The most straightforward means to assess these potential impacts is to evaluate overall mobile source emission trends.

The following significance criterion is used to assess whether proposed improvements in the Expenditure Plan would have a significant adverse effect on air quality for criteria air pollutants:

- **Criterion 1:** Violation of the ambient air quality standards during construction. The Expenditure Plan would be considered to have a significant impact if construction emissions associated with Expenditure Plan projects would lead to local violations of the ambient air quality standards. If adequate dust control measures are implemented as recommended by the BAAQMD, this impact would be considered less than significant
- **Criterion 2:** Increase in emissions above BAAQMD thresholds. Implementation of the Expenditure Plan would have a potentially significant impact if emissions of ROG, NOx, PM-10, and CO resulting from the Plan's transportation improvements would cause an increase greater than the BAAQMD annual significance threshold of 15 tons per year for ROG, NOx and PM-10, and 100 tons per year for CO.

For the purposes of addressing cumulative impacts, it is considered a significant cumulative impact if future emissions are above today's levels and the increase is primarily related to travel demand increases due to regional growth (see cumulative impacts discussion in Chapter 5).

Method of Analysis

The emissions changes discussed in this analysis represent the aggregation of all transportation projects included in the proposed Expenditure Plan. This EIR does not examine effects on emissions (primarily project-level CO and PM-10) of the individual transportation improvements included in the Plan. The analysis in this section is based on the results of the modeling conducted using the San Francisco Travel Demand Model (SF-TDM) for the traffic analysis. These results have been used along with CARB emission factors to estimate the change in criteria pollutant emissions over existing conditions.

The SF-TDM is used to project future traffic and transit volumes in San Francisco. This model is consistent with the regional demand and was specifically developed to deal with local conditions including traffic and transit patterns. The traffic modeling included several assumptions, which are discussed in more detail in the traffic section of this EIR (see Section 3.2.2). The key output from the traffic model used in this air quality analysis is the change in vehicle miles traveled (VMT) due to the implementation of projects included in the Expenditure Plan.

Emission factors for different vehicle types and calendar years 2000 and 2025 were estimated using the latest version of CARB's emission factor model, EMFAC2002. This version of EMFAC was released on September 23, 2002. EMFAC2002 is an integrated, modular system of programs with the modules performing the functions of the computer programs CALIMFAC, WEIGHT, EMFAC and BURDEN that were used in previous versions of the model. Although the EMFAC2002 modules have been integrated into a single program, the functions of EMFAC2002 are discussed in terms of the individual modules to make it easier to understand the model.

The "CALifornia Inspection/Maintenance emission FACtor" (CALIMFAC) module computes base emission rates for each technology group, with and without inspection and maintenance (I/M) benefits. The base emission rates consist of a zero mile rate and a deterioration rate for each model year for each pollutant. The "EMission FACtor" (EMFAC) module computes fleet composite emission factors by vehicle class, speed, ambient temperature, emissions process and technology for a calendar year. The WEIGHT module provides EMFAC with activity weighting fractions for individual model years so that the fleet composite emission factors can be produced. The WEIGHT module also provides the accumulated mileage by model year for any particular calendar year in order to calculate the "deteriorated" emission rate for a model year. The BURDEN module calculates the emission estimates (in tons per day) by multiplying the composite emission factors from EMFAC by activity estimates.

To estimate emissions from transit activity, increase in transit miles for operators such as MUNI and the Golden Gate Ferry were multiplied by appropriate emission factors. MUNI operates five different vehicle types, which use different fuel technologies (see Table 3.3-7). Emissions were estimated only for MUNI motor coaches and ferries. Other MUNI vehicles, which are fueled by electricity, have no direct emissions. For MUNI motor coaches, emission factors for 2000 and 2025 were estimated using EMFAC 2002.

Ferry emissions were estimated using U.S. EPA Tier II standards for Category 2 marine diesel engines. Consistent with the Water Transit Authority's Drat EIR for the Expansion for Ferry Transit Service in the San Francisco Bay Area, Tier II emission factors were adjusted to account for the use of Selective Catalytic Reduction (SCR) and diesel particulate traps on the ferries. The total emissions attributable to the proposed Expenditure Plan projects were then compared to the BAAQMD significance thresholds to determine the impact significance.

Summary of Impacts

The implementation of the proposed Expenditure Plan could have several types of air quality impacts: short-term, localized impacts during project construction, long-term impacts from increase in the regional pollution load, local impacts on carbon monoxide and particulate matter concentrations along busy roadways and congested intersections, and cumulative impact of the implementation of Expenditure Plan projects along with other planned development in San Francisco and generally, in the Bay Area (see Chapter 5 for discussion of cumulative effects).

Impacts and Mitigation Measures

Impact 3.3-a Construction activities associated with the transportation improvements in the proposed Expenditure Plan could result in short-term impacts on air quality near construction sites. (Significant, mitigable)

Many of the transportation improvements included in the Expenditure Plan involve construction. Construction activities would occur intermittently at different areas of San Francisco throughout the Plan implementation period . Although the impacts at any one location would be temporary, construction of individual projects under the proposed Expenditure Plan could cause adverse effects on the local air quality. Construction activities would generate substantial amounts of dust (including PM-10 and PM-2.5) primarily from "fugitive" sources (i.e., emissions released through means other than through a stack or tailpipe) and lesser amounts of other criteria air pollutants primarily from operation of heavy equipment construction machinery (primarily diesel operated) and construction worker automobile trips (primarily gasoline operated).

Fugitive dust emissions would vary from day to day, depending on the level and type of activity, silt content of the soil, and the prevailing weather. Sources of fugitive dust would include vehicle movement over paved and unpaved surfaces, demolition, excavation, earth movement, grading, and wind erosion from exposed surfaces. In the absence of mitigation, construction activities may result in significant quantities of dust, and as a result, local visibility and PM-10 concentrations may be adversely affected on a temporary and intermittent basis during the construction period. In addition, the fugitive dust generated by construction would include not only PM-10, but also larger particles, which would fall out of the atmosphere within several hundred feet of the site and could result in nuisance-type impacts. Demolition of buildings constructed prior to 1980 often involves hazardous materials such as asbestos used in insulation, fire retardants, or building materials (floor tile, roofing, etc.) and lead-based paint. Airborne asbestos fibers and lead dust pose a serious health threat. The demolition, renovation and removal of asbestos-containing building materials would be subject to the requirements of BAAQMD Regulation 11, Rule 2.

The BAAQMD's approach to analyses of construction impacts is to emphasize implementation of effective and comprehensive control measures rather than detailed quantification of emissions. The District considers any project's construction related impacts to be less than significant if the required dust-control measures are implemented. Without these measures, the impact is considered significant.

Construction activities would also result in the emission of other criteria pollutants from equipment exhaust, construction-related vehicular activity, and construction worker automobile trips. Emission levels would vary depending on the number and type of equipment, duration of use, operation schedules, and the number of construction workers. Criteria pollutant emissions of

ROG and NOx from these emission sources would incrementally add to the regional atmospheric loading of ozone precursors during project construction. BAAQMD CEQA Guidelines recognize that construction equipment emit ozone precursors, but indicate that such emissions are included in the emission inventory that is the basis for regional air quality plans. Therefore, construction emissions are not expected to impede attainment or maintenance of ozone standards in the Bay Area (BAQMD, 1999).

Construction impacts will be analyzed in more detail in subsequent project-specific environmental documents. These documents would also identify the level of mitigation required to reduce any significant impacts to a less than significant level. The level of mitigation would be project and site dependent based on the BAAQMD's recommendations.

Mitigation Measure

A-1 SFCTA shall require that project sponsors comply with to undertake effective and comprehensive measures to appropriate measures that would minimize or eliminate any significant impacts on air quality associated with construction. Project sponsors shall commit to mitigation measures at the time of certification of their project environmental document. These measures may include:

- Appropriate dust abatement programs, patterned after the BAAQMD approach, shall be implemented by the sponsor for individual projects under the proposed Expenditure Plan. The BAAQMD approach calls for "basic" control measures that should be implemented at all construction sites, "enhanced" control measures that should be implemented at construction sites greater than four acres in area, and "optional" control measures that should be implemented on a case-by-case basis at construction sites that are large in area, located near sensitive receptors or which, for any other reason, may warrant additional emissions reductions (BAAQMD, 1999).
- Mitigation measures included in the Caltrans' Highway Design Manual that are designed to limit air quality impacts from construction should be used by the project sponsor, as appropriate, during the design phase of projects and written into construction documents.
- If a specific project under the Expenditure Plan would entail the demolition of a building containing asbestos materials, consultation with BAAQMD staff concerning the specific requirements of Regulation 11, Rule 2 (Asbestos Demolition, Renovation and Manufacturing) of BAAQMD's regulations.

Significance After Mitigation

Implementation of this mitigation measure would reduce any significant impacts resulting from construction to a less than significant level.

Impact 3.3-b Transportation improvements proposed as part of the Expenditure Plan, including transit service expansions/enhancements and major new roadway capital projects could reduce emissions of criteria pollutants (ROG, PM-10 and CO) and increase NOx emissions. (Beneficial for ROG, PM-10, and CO; less than significant for NOx)

Transportation improvements included in the Expenditure Plan would affect both vehicle miles traveled (VMT) and transit miles traveled within San Francisco. Transit operators whose activity would be affected by the Expenditure Plan projects include SF MUNI, Caltrain, and the Golden Gate Ferry. Changes to transit miles traveled by MUNI vehicles would result primarily from the extension of service to areas not currently served and the increase in total MUNI vehicles (including motor coaches, trolley coaches, cable cars and light rail).

In November, 2002, the Transportation Authority approved a policy resolution (Resolution No. 03-30) stating that the Authority will no longer fund new procurements of diesel fueled buses. Moreover, by state law, all transit vehicles must be Zero Emission Vehicles (ZEV) by 2025. This requirement would apply to motor coaches, as they are the only MUNI vehicle type that are not fueled by electricity. However, given that there is currently no transit engine technology that comes close to reaching 2007 California emissions regulations (as engines in 2007 will need to be 12.5 times cleaner than current engines), technology choices in 2025 are difficult to predict. Therefore, this analysis conservatively assumes that all motor coaches in MUNI's fleet will continue to operate as diesel vehicles, but that improved technology will result in cleaner diesel fuel.

In actuality, because Resolution No. 03-30 no longer allows the use of sales tax funds to procure regular diesel buses, MUNI is in the process of procuring "clean diesel" buses, which will be used in conjunction with particulate traps.[2] Under an assumption that MUNI continues to use clean diesel buses together with particulate traps, emissions of SO2 would further be reduced by as much as 80%, and particulates by as much as 90%, compared with the assumptions used in this analysis based on regular diesel bus fleets. Moreover, if feasible engine technology is developed to meet the regulatory requirements, emissions from MUNI motor coaches could be eliminated altogether in 2025, further reducing adverse emission effects.

Increase in Caltrain activity would result from the extension of Caltrain to downtown San Francisco. Lastly, the Expenditure Plan also includes some improvements to ferries and intermodal facilities, including at the the Downtown Ferry Terminals. The analysis conservatively assumes that Expenditure Plan investments would help to accommodate an increase in passengers and vessels from expanded ferry service as projected by the Water Transit Authority (WTA). This would increase miles traveled by the ferries to and from San Francisco. The assumption to include expanded ferry services in the analysis of Expenditure Plan investments at the Ferry terminal is conservative because the modest proposed investment of $5 million alone is not sufficient to fund expansion of ferry services; expansion of ferry services would only be enabled by passage of proposed legislation (SB916), which among other improvements, would fund water transit services across the Bay.

---

[2] "Clean Diesel" is ultra low sulfur diesel (15 ppm sulfur as opposed to 500 ppm sulfer in regular diesel).

The Expenditure Plan also includes roadway capital projects such as the Doyle Drive project(a replacement project that does not expand capacity on that facility), and improvements in the San Francisco/San Mateo bi-county area. For purposes of analysis, the bi-county area improvements were assumed to include Carroll Avenue Overpass, Geneva Avenue Extension and Candlestick Point interchange as well as other traffic calming projects and projects that improve roadway system and operations efficiency, although specific investments in that area remain to be identified through further study.

The combined effect of all these projects is a reduction in VMT on the streets of San Francisco, compared to the future baseline without the Expenditure Plan. As described in the transportation analysis in Section 3.2, overall VMT will increase over the next 25 years (with or without the Expenditure Plan), due to an increase in population and employment in the city. Table 3.3-7 outlines the changes in activity associated with the proposed Expenditure Plan projects, indicating a substantial increase in VMT associated with electric vehicles, which have no emissions.

Table 3.3-7: Changes in Daily VMT Within San Francisco Associated with Expenditure Plan Projects

Operator	*Fuel Type in 2000*	*Assumed Fuel Type in 2025*	*Changes in Daily VMT due to Expenditure Plan (Compared to 2025 Baseline – No Project)*
Transit			
MUNI			
Motor Coaches	Diesel[a]	Diesel[a]	+151
Trolley Coaches	Electricity	Electricity	+2,357
Cable Car	Electricity	Electricity	0
Historic Light Rail	Electricity	Electricity	+1,677
Light Rail	Electricity	Electricity	+624
Caltrain	Diesel	Electricity	+504
Ferry	Diesel	Diesel	+497
Non-Transit	All	All	-82,051

[a] Transportation Authority Resolution No. 03-30 establishes as policy that the Authority will no longer fund procurement of diesel buses; however, for purposes of this analysis, MUNI motor coaches are conservatively assumed to remain diesel powered in the future.

Source: San Francisco County Transit Authority, May 2003.

With the implementation of the Expenditure Plan, the conversion of several routes currently served by diesel fueled MUNI motor coaches (such as the 3rd Street route and BRT routes) to electric would result in a net reduction in overall emissions. The analysis also assumes that the planned electrification of Caltrain will take place, as feasible technology is currently available. Therefore, the increased VMT for Caltrain would be fueled by electricity and would not be a source of direct emissions. Emission factors of other non-transit vehicles would also continue to improve with more stringent requirements on engine manufacturers, the turnover of the existing fleet to cleaner vehicles, and the use of cleaner burning fuels.

As discussed in the methodology, the emissions from the increased ferry activity were estimated using emission factors consistent with those used the WTA's Ferry Transit Expansion Plan. The assumption was that all ferries in the year 2025, with or without the Expenditure Plan, would have engines that would at least meet the U.S. EPA Tier 2 standards. These standards require new diesel engines manufactured after the year 2007 to meet lower emission requirements than current diesel engines. In addition, consistent with the assumptions in the WTA's analysis, ferries would have control devices to reduce the levels of NOx and PM-10. SCR and particulate traps would reduce NOx emissions to 10 percent of Tier 2 levels and PM-10 emissions to 5 percent of Tier 2 levels.

The reduction in non-transit VMT, compared to the 2025 baseline (No Project) (due to higher transit use and less private vehicle use) along with lower emission factors would reduce emissions. Similarly the electrification of Caltrain, conversion of several MUNI routes from diesel-fueled vehicles to electric vehicles, and the use of cleaner diesel motor coaches by MUNI in 2025 would also reduce emissions. These reductions are shown in Table 3.3-8 below. The only increase in emissions would result from the increase in ferry activity, an improvement that was conservatively assumed in this analysis, but that would only be made feasible by passage of pending state legislation that identifies significant capital and operating finance for ferries. The combined impact of all these changes to on-road transit, ferry, and non-transit (private vehicles) activity due to the implementation of the Expenditure Plan alone would be a less than significant increase of 0.8 tons per year in NOx emissions and a reduction of ROG, PM-10 and CO emissions (comparison to the 2025 Base scenario). The increase in NOx emissions would be well below the BAAQMD threshold of 15 tons per year. Therefore, implementation of the Expenditure Plan would result in a less than significant impact with respect to NOx emissions and a beneficial impact with respect to ROG, CO and PM-10 emissions.

Table 3.3-8: Emissions Associated with Expenditure Plan Projects

Source	*Increase in Annual Emissions due to the Expenditure Plan (Compared to 2025 Baseline – No Project) (tons per year)*			
	ROG	*NOx*	*CO*	*PM-10*
Transit				
MUNI				
Motor Coaches[a]	+0.3	+0.3	+0.3	+<0.01
Trolley Coaches	0.0	0.0	0.0	0.0
Cable Car	0.0	0.0	0.0	0.0
Historic Light Rail	0.0	0.0	0.0	0.0
Light Rail	0.0	0.0	0.0	0.0
Caltrain	0.0	0.0	0.0	0.0
Ferry	+1.1	+4.2	+2.4	+<0.01
Total Transit Emissions	+1.4	+4.5	+2.7	+<0.01
Non-Transit Emissions	-19.2	-3.8	-34.4	-10.6
Total Expenditure Plan Emissions	-17.8	+0.8	-31.7	-10.6
BAAQMD Significance Threshold	15	15	100	15

[a] Assuming MUNI buses convert to clean diesel, in conjunction with particulate traps, sulfur emissions could reduce by a further 80% and particulate matter emissions by 90%.

Source: Environmental Science Associates, May 2003.

It must be noted that electricity use would increase in 2025. This increase is discussed in more detail in the Energy Analysis section (Section 3.6) of this document. This analysis does not account for the emissions generated during electricity generation, as typically transit operators do not use electricity from the local PG&E grid. For instance, BART has a contract with Bonneville Power Administration for its electricity needs, which is outside the Bay Area Air Basin. Therefore, these emissions are not assumed to contribute to air pollution levels in the Bay Area. The source of electricity for Caltrain operations in 2025 is not known. Even within the local grid, emissions vary depending on the power plant, the fuel being used and other factors. Hence, these emissions have not been quantified in this analysis.

Mitigation Measures

No mitigation measure would be required as this would mostly be a beneficial impact on regional air quality. The increase in NOx emissions would be less than significant.

3.4 BIOLOGICAL RESOURCES

3.4.1 SETTING

This chapter describes the biological resources of the City and County of San Francisco. Information was drawn from biological data presented in the California Department of Fish and Game Natural Diversity Data Base (CNDDB)[1] and California Native Plant Society's (CNPS) Electronic Inventory of Rare and Endangered Vascular Plants of California, local historical and current information on San Francisco's remaining biological resources from a variety of sources, recent local general and area plans and environmental impact reports, and environmental impact reports on specific transportation projects. Various habitat types found in the region and associated rare, threatened and endangered (special-status) species, and areas of ecological significance are characterized. The potential effects of the proposed SFCTA Expenditure Plan and implementation of the various types of projects supported by the Plan on sensitive species and habitats are identified. The information and analysis presented are broad in scope, covering the entirety of San Francisco County. The assessment is intended to assist area-wide issue identification as it relates to county-wide transportation improvement planning. Site-specific environmental assessment will be necessary to determine the impacts of specific transportation projects on biological resources.

Biological Resources in San Francisco

Background

A unique diversity of topography, rocks and soil types, and climatic gradients combined historically to create a rich and heterogeneous assemblage of plant, wildlife, and wetland resources in the San Francisco region. Elevations in San Francisco County range from sea level along the Pacific Ocean coastline and San Francisco Bay to over 900 feet at Mount Davidson, Mount Sutro, and Twin Peaks. Folding, faulting, and uplift along the San Andreas Fault system has formed a series of low, parallel mountain ranges, part of California's Coast Range, that trend from northwest to southeast within the SFCTA region. These mountains and hills help to define a climatic gradient that becomes progressively warmer and drier as distance increases from the coast, a trend evident even within the approximately five mile span across San Francisco from the Pacific Ocean to San Francisco Bay.

San Francisco County's Mediterranean climate is tempered by coastal maritime influences, though the factors mentioned above combine in a complex interplay to create variable local meteorological characteristics. Prevailing winds are from the northwest, generally resulting in the highest precipitation in the outer mountain ranges near the coast. However, varying topography across the area creates local microclimates. As a result, precipitation values average 19.9 inches annually in the Richmond District of the City and 20.88 inches in the Mission District, while annual high temperatures average 61.8°F and 63.5°F respectively and annual low temperatures average 49.3°F and 51.0°F respectively.[2] Overall, San Francisco tends to have moderate temperatures year-round, with the warmest summer temperatures inland from the coast, in areas protected from fog incursion and cold winter temperatures moderated by proximity to the ocean and bay waters.

---

[1] The CNDDB is a computer data base of the location and distribution of animals and plants that are rare, threatened, endangered or candidate species, or habitat considered to be of high quality or of limited distribution.

One result of its extraordinary geologic history and variable climate is that the greater Bay Area supports a high regional diversity of species. Most of the species present in San Francisco are widespread throughout the Bay Area and the western United States in areas with similar ecological attributes. Some of the species present may be locally rare but represent the northern- or southernmost extensions of more widely distributed species. Still others are endemic, occurring in localized habitats found only on the San Francisco Peninsula. Some have evolved into new species during long separation from other populations, under the new or changing ecological conditions prevailing here. Other species, especially plants, may have arisen when closely related but distinct species came into contact through migrations, and the resulting hybrids were both fertile and possessed features uniquely suited to prevailing conditions. The result of this long history of species migrations, changing ecological conditions and landforms, and speciation is a unique and complex flora and fauna with many relatively recently-evolved species (Munz and Keck, 1968). While this kind of diversity was once present within San Francisco, urbanization has resulted in a nearly complete loss of natural plant and animal communities and the extirpation[3] of many species known to once inhabit the region.

Existing Ecosystems in the San Francisco Region

Once a mosaic of native annual and perennial grasslands, coastal and riparian scrubs, a variety of coastal dune communities, and both fresh- and saltwater wetland communities, with occasional oak woodlands, the historical natural environment of San Francisco County has been significantly altered in the past 150 years. Most of the shoreline and surrounding upland areas have been converted to urban uses. Remaining areas of natural vegetation have often been disturbed at some point in the past, in addition to being isolated, fragmented, and found only in small, discrete areas. In addition, the planting of exotic trees and other non-native vegetation in most remaining areas of open space has resulted in the displacement of the natural communities that once covered the landscape. This loss of habitat has resulted in the elimination of many wildlife species and a reduction in numbers of many native species in the region. Most remaining native vegetation occurs in widely scattered areas including the Presidio, on Yerba Buena Island, at Bayview Hill near Candlestick Park, on Mount Davidson, on Twin Peaks, in Glen Canyon, and on Bernal Heights. Typically these areas include steep rocky slopes that have remained undeveloped.

---

[2] Western Regional Climate Center, www.wrcc.dri.edu. Period of record monthly climate summaries for San Francisco Richmond, California (047767) and San Francisco Mission Dolores, California (047772).

[3] This term refers to the local extinction of a species. While the species may no longer occur in one locale, it persists in others.

Although native biological resources are isolated, fragmented, and occur only in small patches, San Francisco County still supports a diversity of natural communities, as well as introduced communities that provide plant and wildlife habitat. These include vegetative communities, wetlands, estuaries, streams, and urban/highly disturbed habitats.[4] The broad plant community types discussed below are characterized using the community categories developed by Barbour and Major (1977). Broad habitat categories include coastal scrubs, oak woodlands, grasslands, coastal salt marsh and estuaries, freshwater wetland and riparian habitat, and eucalyptus, Monterey pine, and Monterey cypress groves. Within these broad categories more specific vegetation types, as described by Holland (1986) are discussed. Due to the amount of native vegetation lost to urbanization throughout California, many native vegetative communities have been identified as rare and/or sensitive by the California Department of Fish and Game (CDFG). These natural communities are of special significance because the present rate of loss indicates that additional acreage reductions or further habitat degradation may threaten the viability of dependent plant and wildlife species and possibly hinder the long-term sustainability of the community or species dependent upon the community.

Some of these natural communities have a rich complement of sensitive species and species-oriented programs that will usually protect them. Other communities do not support rare species and, therefore, species-oriented protection cannot be invoked. Sensitive communities in San Francisco include central dune scrub, northern coastal bluff scrub, mixed serpentine chaparral, serpentine bunchgrass grassland, northern coastal saltmarsh, and freshwater wetlands (CDFG, 2002).[5] The following is a description of each of the vegetative communities occurring within San Francisco. Figure 3.4-1 shows locations with remaining sensitive natural resources in the Project area. These areas contain one or more of the above sensitive communities and/or provide habitat with the potential to support one or more special status[6] plant or animal species.

Special-Status Species

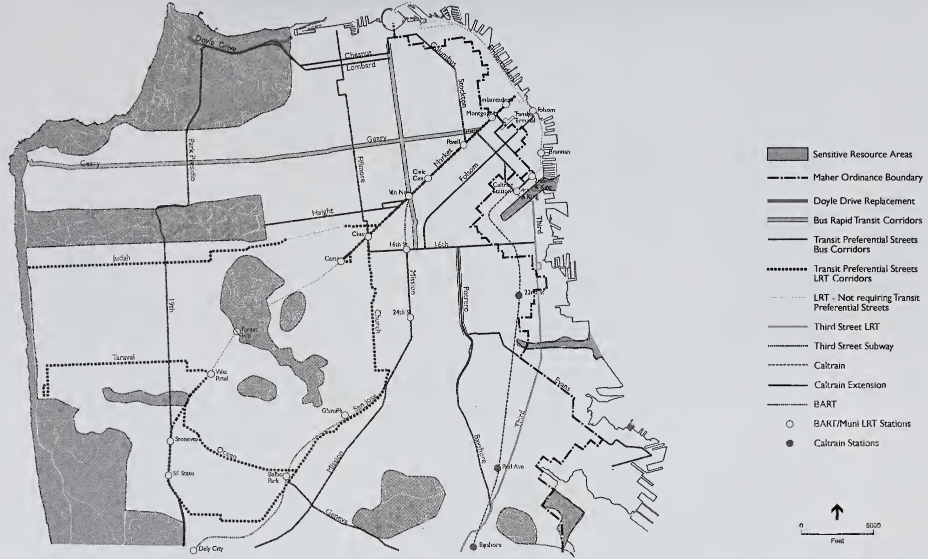
Table 3.4-1 presents a focused list of special status species with moderate to high potential to occur in the project area as defined in the Project Description and includes their legal status, distribution,

---

[4] Natural communities are made up of aggregates of species that reoccur due to responses to similar combinations of environmental conditions and are not dependent on human intervention. For this discussion, native vegetation pertains to those species present in California prior to European colonization, while species such as wild oats and brome grasses, which dominate much of the current California landscape, are considered non-native. Vegetative communities that are dependent on human intervention, such as horticultural species, irrigated agriculture, or landscaping, are considered introduced communities.

[5] CDFG and CNPS recognize uncommon, vulnerable, or regionally declining habitat types as sensitive or significant communities. These communities are tracked by CDFG in the California Natural Diversity Data Base. Each community appearing in the database is assigned a rarity and threat ranking that indicates current known acreage of the community, known threats, and the community's sensitivity to perturbation.

[6] Species are accorded "special status" because of their recognized rarity or vulnerability to habitat loss or population decline. Some are formally listed and receive specific protection defined in federal or state endangered species legislation. Other species have no formal listing status as threatened or endangered, but are designated as "rare" or "sensitive" on the basis of policies adopted by state resource agencies or organizations with acknowledged expertise, such as the California Native Plant Society.



SOURCE: Dyett & Bhatia; Environmental Science Associates

Figure 3.4: Sensitive Resource Areas

and habitat associations. This list was compiled from information on special status species with the potential to occur in San Francisco County obtained from the U.S. Fish and Wildlife Service (USFWS, 2003), the California Department of Fish and Game's (CDFG) California Natural Diversity Data Base (CNDDB, 2003), and the California Native Plant Society's Electronic Inventory of Rare and Endangered Vascular Plants (CNPS 2002). Previous regionally-based and project-specific EIRs, a variety of maps, including historical creek, habitat, and vegetation maps, and proposed SFCTA Expenditure Plan projects were reviewed to gain an understanding of the various habitat types existing within the city and their spatial relationship to the locations of the various proposed project components. Standard scientific literature, including The Jepson Manual, a variety of field guides, and the above-mentioned electronic databases, were reviewed to determine the distribution and habitat requirements of species potentially affected by the project. Plant and animal species at all levels of state and federal concern were evaluated; many of these were removed from analysis due to (1) absence established as a result of previous surveys, (2) the known range of the species falling outside the project study area, (3) very low occurrence potential in the project study area or project vicinity, or (4) a lack of suitable habitat in the project study area. The remaining species are presented in the following table.

Table 3.4-1: Focused List of Special-Status Species with Potential to Occur within the San Francisco Project Area

Common name *Scientific name*	*Listing Status* *USFWS/CDFG/CNPS*	*Habitat Requirements and Distribution*
	SPECIES LISTED OR PROPOSED FOR LISTING	
Invertebrates		
Mission blue butterfly Icaricia icarioides missionensis	FE/–	Grassland and coastal scrub with Lupinus albifrons, L. formosa, and L. varicolor Known primarily from San Mateo County but also occurs at Twin Peaks in San Francisco and at the north end of the Golden Gate Bridge in Marin County.
Fish		
Steelhead – Central California Coastal ESU Oncorhynchus mykiss irideus	FT/CSC	Accessible Bay Area and coastal rivers and streams. Migrating individuals likely present in Bay waters adjacent to San Francisco, but spawning habitat no longer present within the county.
Amphibians		
California red-legged frog Rana aurora draytonii	FT/–	Breed in stock ponds, lakes, and slow moving streams, generally but do not always require emergent vegetation. Often make use of upland dry season refugia (mammal burrows). Documented from lakes and ponds in the Presidio and Golden Gate Park (as recently as 1993), as well as from Lake Merced (CNDDB 2003).
Birds		
California brown pelican Pelecanus occidentalis californicus	FE/3511	Nests on coastal islands of small to moderate size that afford protection from predators. Known to occur in

Table 3.4-1: Focused List of Special-Status Species with Potential to Occur within the San Francisco Project Area

Common name *Scientific name*	*Listing Status* *USFWS/CDFG/CNPS*	*Habitat Requirements and Distribution*
		the project area. Forage in Bay waters, roost and loaf on piers and breakwaters during winter months.
Bank swallow Riparia riparia	–/CT	Nests primarily in riparian and other lowland habitat. Requires vertical banks or cliffs with fine textured or sandy soils near water. Recently documented nesting colonies located at Fort Funston and Lake Merced (CNDDB, 2003).
Plants		
Presidio clarkia Clarkia franciscana	FE/CE/List 1B	Coastal scrub, grassland on serpentine and other ultramafic soils. A plant with highly limited distribution. Several extant populations occur at the Presidio and in the Oakland Hills.
Marin dwarf flax Hesperolinon congestum	FT/CT/List 1B	Grassland and openings in chaparral, often on serpentinite. Known to occur at the Presidio.
San Francisco lessingia Lessingia germanorum	FE/CE/List 1B	Coastal scrub on remnant dunes. In sandy soils where cover is open and competition from other species is low. Species has been reintroduced at the Presidio.
Federal or State species of Special Concern		
Invertebrates		
Bumblebee scarab beetle Lichnanthe ursina	FSC/–	Inhabits coastal sand dunes. Historical collections made from Ocean Beach in the 1940's (CNDDB, 2003). No recent documented occurrences but suitable habitat may still exist.
Reptiles		
Western pond turtle Clemmys marmorata	FSC/CSC	Freshwater ponds, lakes, and slow streams, marshes, rivers, and irrigation ditches with upland sandy soils for laying eggs. Recently documented at Pine Lake and Lake Merced (CNDDB 2003).
Birds		
Olive-sided flycatcher Contopus cooperi	FSC/–	Conifer forest from near sea level to 9,000 feet. Also exotic cypress, pine, and eucalyptus groves. Known to breed in San Francisco (San Francisco Field Ornithologists (SFFO), 2002)
California yellow warbler Dendroica petechia brewsteri	–/CSC	Nests in riparian areas dominated by willows, cottonwoods, sycamores, alders, or mature chaparral; may use urban areas near waterways. Probable breeder in San Francisco in suitable habitat (SFFO, 2002).
American peregrine falcon Falco peregrinus anatum	Delisted	Nests near wetlands, lakes, rivers, or other water on cliffs, banks, human structures. Known to nest on Bay Bridge and tall buildings in San Francisco (SFFO, 2002). Forages over open bay waters and possibly over open areas in city parks.

Table 3.4-1: Focused List of Special-Status Species with Potential to Occur within the San Francisco Project Area

Common name *Scientific name*	*Listing Status* *USFWS/CDFG/CNPS*	*Habitat Requirements and Distribution*
Loggerhead shrike Lanius ludovicianus	FSC/CSC	Frequents scrub habitat and forages in open grasslands. Possible breeder in San Francisco but not confirmed (SFFO, 2002).
Double-crested cormorant Phalacrocorax auritus	–/CSC	Nests along coast on isolated islands or in trees along lake margins. Forages in bay waters and loafs along the San Francisco waterfront but only nearby breeding site is the Farallones.
Allen's hummingbird Selasphorus sasin	FSC/--	Brush and woodlands. Known to breed in suitable habitat in San Francisco (SFFO, 2002).
Mammals		
Yuma myotis Myotis yumanensis	FSC/--	Optimal habitat is open forests or woodlands with sources of water and flying insects. Nursery colonies in caves, buildings, or crevices. Documented at the Presidio (ESA 2002).
Harbor seal Phoca vitulina	MMPA/--	Range from Alaska to Baja California. They favor near-shore coastal waters and are often seen at sandy beaches, mudflats, bays, and estuaries. Known haul out sites in San Francisco County include Treasure Island.
Harbor porpoise Phocoena phocoena	MMPA/--	Ranges from Alaska to California. Generally found in nearshore waters. Known to occur in San Francisco Bay.
California sea lion Zalophus californianus	MMPA/--	Occur from Baja California to Alaska. Inhabit rocky and sandy beaches of coastal islands and mainland shorelines. Colony known from Pier 39 in San Francisco.
Plants		
Coast rock cress Arabis blepharophylla	FSLC/–/List 4	Rocky outcrops, grassy slopes. Documented at the Presidio (NPS, 2001)
Nuttall's milk-vetch Astragalus nuttallii var. virgatus	FSLC/–/List 4	Open bluffs, dunes, and sandy areas, not documented from the area but suitable habitat exists.
Marsh milk-vetch Astragalus pychnostachyus var. pychnostachyus	FSLC/–/List 1B	Coastal marshes or swamps
California saltbush Atriplex californica	FSLC/–/–	Coastal and salt-marsh habitats; sandy, coastal areas, and at seaside.
Bristly sedge Carex comosa	--/--/List 2	Coastal prairie, freshwater marshes (lake margins), valley and foothill grassland
Coast Indian paintbrush Castilleja affinis ssp. affinis	FSLC/–/–	Chaparral and coastal scrub.
Purple owl's clover Castilleja exserta ssp. latifolia	FSLC/–/–	Coastal bluffs, dunes
California goosefoot Chenopodium californicum	FSLC/–/–	Generally open sites; sandy to clay soils.

Table 3.4-1: Focused List of Special-Status Species with Potential to Occur within the San Francisco Project Area

Common name *Scientific name*	*Listing Status* *USFWS/CDFG/CNPS*	*Habitat Requirements and Distribution*
San Francisco Bay spineflower Chorizanthe cuspidata var. cuspidata	FSC/--/List 1B	Coastal bluff scrub, coastal dunes, coastal prairie, on sandy soils. Occurs at the Presidio and at Fort Funston.
Franciscan thistle Cirsium andrewsii	--/--/List 1B	Mesic locales in broadleafed upland forests, coastal bluff scrub, coastal prairie, sometimes on serpentine soils. Known from coastal bluffs at the Presidio (NPS 2001).
Compact cobwebby thistle Cirsium occidentale var. compactum	--/--/List 1B	On coastal dunes and clay soils in chaparral, coastal prairie, coastal scrub
Davy's clarkia Clarkia davyi	FSLC/--/--	Coastal grassland and bluffs.
Round-headed collinsia Collinsia corymbosa	--/--/List 1B	Coastal dunes and coastal prairie
San Francisco collinsia Collinsia multicolor	--/--/List 1B	Closed-cone coniferous forests, coastal scrub, sometimes on serpentinite derived soils. Documented from Bay View Hill near Candlestick Park (Wood, 1996).
California croton Croton californicus	FSLC/--/--	Sandy soils, dunes and washes. Known from the Presidio dunes, historically more widespread in San Francisco (Wood, 2002).
San Francisco wallflower Erysimum franciscanum	FSC/--/List 4	Coastal dunes, coastal scrub, grasslands, often on serpentinite or granitic soils. Documented at the Presidio (NPS, 2001) and other locations in San Francisco (Wood, 1999).
Dune gilia Gilia capitata ssp. chamissonis	--/--/List 1B	Coastal dunes and coastal scrub. Known to occur at the Presidio (ESA, 2002).
Yarrow-leaf (= dark-eyed) gilia Gilia millefoliata	--/--/List 1B	Coastal dunes
San Francisco gumplant Grindelia hirsutula var. maritima	FSC/--/List 1B	Coastal bluff scrub, coastal scrub, grasslands, on sandy or serpentinite derived soils. Known to occur at the Presidio (NPS, 2001).
Short-leaved evax Hesperevax sparsiflora var. brevifolia	--/--/List 2	Coastal dunes and on sandy substrate in coastal bluff scrub
Wedgeleaf horkelia Horkelia cuneata ssp. cuneata	FSLC/--/--	Old dunes and coastal sandhills
Large-flowered linanthus Linanthus grandiflorus	FSC/--/List 4	Open grassy flats, generally in sandy soils
Rose linanthus Linanthus rosaceus	--/--/List 1B	Coastal bluff scrub
Skunkweed Navarretia squarrosa	FSLC/--/--	Open, wet, gravelly flats and slopes.
California broomrape Orobanche californica ssp. californica	FSLC/--/--	Sandy or heavy soils of coastal bluffs; uncommon. Recently rediscovered at the Presidio (Chasse et al., no date).

Table 3.4-1: Focused List of Special-Status Species with Potential to Occur within the San Francisco Project Area

Common name *Scientific name*	*Listing Status* *USFWS/CDFG/CNPS*	*Habitat Requirements and Distribution*
Coast rein-orchid Piperia elegans	FSLC/–/List 1B	Generally dry, open sites, shrubland, and coniferous forest. Known to occur at Bernal Heights, Glen Canyon, Mount Davidson, and several other locations in San Francisco (Wood, 1996a)
Choris's popcorn-flower Plagiobothrys chorisianus var. chorisianus	–/–/List 1B	Chaparral, coastal prairie, coastal scrub, on mesic sites
Greene's popcorn flower Plagiobothrys reticulatus var. rossianorum	FSC/–/–	Moist places in forests and grasslands-northwest San Francisco.
San Francisco campion Silene verecunda ssp. verecunda	FSC/–/List 1B	Coastal bluff scrub, chaparral, coastal prairie, coastal scrub, grasslands with sandy soil. Know to occur at the Presidio (NPS, 2001).
Pacific cordgrass Spartina foliosa	FSLC/–/–	Salt marshes.
Seashore starwort Stellaria littoralis	FSC/–/List 4	Coastal bluff scrub, coastal dunes, coastal scrub, freshwater marshes
Santa Cruz microseris Stebbinsoseris decipiens	–/–/List 1B	In a variety of habitats, including forests, chaparral, and coastal prairie and scrub on seaward slopes in open areas with loose or disturbed soils.
Dune tansy Tanacetum camphoratum	FSLC/–/–	Coastal dunes
San Francisco owl's-clover Triphysaria floribunda	FSC/–/List 1B	Coastal prairie and grasslands, often on serpentinite substrates. Known to occur at the Presidio (NPS, 2001).
California triquetrella moss Triquetrella californica	–/–/List 1B	Coastal bluff scrub, coastal scrub

STATUS CODES:

Federal Categories (U.S. Fish and Wildlife Service)

FE = Listed as Endangered by the Federal Government
FT = Listed as Threatened by the Federal Government
FPE = Proposed for Listing as Endangered
FPT = Proposed for Listing as Threatened
FC = Candidate for Federal Listing
FSC = Federal Species of Concern
FSLC = Federal Species of Local Concern
MMPA = Marine Mammal Protection Act

State Categories (California Department of Fish and Game)

CE = Listed as Endangered by the State of California
CT = Listed as Threatened by the State of California
CR = Listed as Rare by the State of California

California Native Plant Society (CNPS)

List 1A = Plants presumed extinct in California
List 1B = Plants rare, threatened, or endangered in California and elsewhere
List 2 = Plants rare, threatened, or endangered in CA
List 3 = Need more information
List 4 = Limited distribution

CSC = California Species of Special Concern
* = Special Animals
3511 = Fully Protected Species

Source: CNDDB, 2003; CNPS, 2000; ESA, 2003; USFWS,2003. Other sources cited in table can be found in the references section.

Dune Communities

In San Francisco, remnants of coastal dune communities can still be found at Crissy Field, Baker Beach, Lobos Creek, Fort Funston, Lake Merced, and along Ocean Beach, among scattered other locations throughout the City (Wood, 1997).

The northern foredune community occurs adjacent to beaches. This community is subject to harsh environmental conditions, resulting in an open community with sparsely distributed low-growing herbs and subshrubs (low-growing woody species). Iceplant (Carpobrotus edulis) occurs in disturbed areas, and has displaced much of the northern foredune community. Dominant species in northern foredune can include sand-verbenas (Abronia spp.), beach primrose (Camissonia cheiranthifolia), silvery beachweed (Ambrosia chamissonis), and coastal sagewort (Artemisia pycnocephala).

Central dune scrub lies adjacent to and directly inland from northern foredune. This community consists primarily of subshrubs. The distribution of plants is fairly dense. Salt-spray deposition and sand blowouts are thus reduced by dense vegetation. Dominant species can include dune sagebrush (Artemisia pycnocephala), mock heather (Ericameria ericoides), coyote brush (Baccharis pilularis), yellow lupine (Lupinus arboreus) and seaside woolly sunflower (Eriophyllum staechadifolium), sticky monkeyflower (Mimulus aurantiacus), California coffeeberry (Rhamnus californica), and western poison oak (Toxicodendron diversilobum).

Special status plants that occur in San Francisco's dune communities include San Francisco wallflower (Eryismum franciscanum), dune gilia (Gilia capitata ssp. chamissonis), San Francisco Bay spineflower (Chorizanthe cuspidata var. cuspidata), San Francisco lessingia (Lessingia germanorum), and San Francisco campion (Silene verecunda ssp. verecunda) .

Coastal Scrub and Chaparral

The coastal scrub plant communities in the region include northern coastal bluff scrub and northern coastal scrub, which can be found on Yerba Buena Island (Wood 1998a) and at the Presidio. Within the project area these communities can be dominated either by California sagebrush (Artemisia californica), in more xeric[7] situations, or coyote brush (Baccharis pilularis), in more mesic[8] conditions. Mixed serpentine chaparral also occurs in the project region and can be found at the Presidio. These plant communities often dominate, steep, rocky, slopes and bluffs. Generally, these are communities of dense, low shrubs with scattered grassy openings. Most growth and flowering occur in late spring and early summer.

Northern coastal bluff scrub lies on terraces of coastal bluffs. The composition of dominant species in northern coastal bluff scrub is similar to northern coastal scrub (see below). The main difference between these two communities is that northern coastal bluff scrub occurs on steeper slopes and is exposed to harsher environmental conditions (e.g., salt spray, wind, and sun exposure) than northern coastal scrub.

---

[7] Relatively dry and hot conditions, such as tend to occur on south facing, rocky slopes.

[8] Relatively cool and moist conditions, such as those that occur along streams or on north facing slopes.

Northern coastal scrub occurs primarily in locations inland from northern coastal bluff scrub. Dominant plant species in northern coastal scrub include, coyote brush, blue blossom ceanothus (Ceanothus thrysiflorus), toyon (Heteromeles arbutifolia), sticky monkeyflower and poison oak (Toxicodendron diversilobum).

Mixed serpentine chaparral occurs on shallow serpentine soils and supports primarily coyote brush, toyon, and blue blossom ceanothus shrubs. Mixed serpentine chaparral is considered a community of limited extent and frequently supports several special status plant species, including, but not limited to, coast rock cress (Arabis blepharophylla), Raven's manzanita (Arctostaphylos hookeri ssp. ravenii) and San Francisco wallflower (Erysium franciscanum).

The distribution of rare plants and wildlife often coincides with the distribution of uncommon geological features. In the case of coastal scrub plant communities, an array of plants and wildlife have adapted to serpentine derived soils in scrub and chaparral habitats, as well as grasslands. Such habitats may occur as individual rock outcrops on hillsides or steeper talus slopes, or as moderately sloped hillsides and alluvial deposits. Rare serpentine adapted scrub and grassland plant species known to occur or to have historically occurred within the project area include: Presidio clarkia (Clarkia franciscana), San Francisco lessingia (Lessingia germanorum), San Francisco campion (Silene verecunda var. verecunda), and San Francisco owl's clover (Triphysaria floribunda). Rare scrub species with the potential to occur in scrub habitats within the project area but not specifically adapted to serpentine habitats include: San Francisco Bay spineflower (Chorizanthe cuspidata var. cuspidata), robust spineflower (Chorizanthe robusta var. robusta), curly-leaved monardella (Monardella undulata), skunkbush (Navarretia squarrosa).

There are relatively fewer rare wildlife species within coastal scrub habitats, and these are typically highly specialized invertebrates whose life histories are intimately dependent upon specific plant species. These include San Bruno elfin butterfly (Incisalia mossii bayensis), and mission blue butterfly (Icaricia icarioides missionensis).

In addition, as a result of the vegetative mosaics in scrub habitats, several of the rare plants described above are also found in grasslands, coastal prairies, and other adjacent habitats, particularly those species with a high affinity for serpentine derived soils. Conditions such as slope, aspect, precipitation, temperature, degree of exposure, and the presence of suitable soil conditions often mandate the distribution of rare species.

Grasslands

Grasslands within San Francisco include two community types as described by Holland (1986): the ubiquitous non-native grasslands, and the less common serpentine bunchgrass grasslands. California annual grassland consists of a dense to sparse cover of non-native annual grasses associated with a variety of broadleaf herbs and perennial grasses and occurs throughout the region. This community has nearly completely replaced the native coastal terrace prairie that once covered much of the project area. The most abundant species are generally non-native annual grasses in the genera Bromus, Avena, Lolium, and Vulpia. Common broadleaf species are quite variable but are also dominated by non-natives and often include filaree (Erodium sp.), yellow-star thistle (Centaurea solstitialis), a variety of lupines (Lupinus sp.), peppergrass (Lepidium sp.), Indian paintbrush (Castilleja sp.), and California poppy (Eschscholzia californica). In addition to considerable site-to-site variation that is largely based on soils and management practices, there is also much year-to-year variation in species composition in response to the timing and amount of precipitation.

Serpentine bunchgrass grasslands are extremely limited in distribution in the city. This open grassland community is dominated by native perennial bunchgrasses of the genera Bromus, Melica, Nasella, Poa, Danthonia, and Festuca. Native herbaceous species include California poppy, tarweed (Hemizonia sp.), lupine, owl's clover (Orthocarpus sp.),and lotus (Lotus sp.). Remnant native grasslands can still be found on Bayview Hill, located between Candlestick Park and Highway 101 (Wood, 1996), as well as at the Presidio.

Grasslands habitats are utilized by a wide variety of wildlife. Reptile species typically found in this habitat include western fence lizard (Sceloporus occidentalis) and western terrestrial garter snake (Thamnophis elegans). Mammals within this habitat typically include brush rabbit (Sylvilagus bachmani), western harvest mouse (Reithrodontomys megalotis), and California vole (Microtus californicus). Typical foraging birds include turkey vulture (Cathartes aura), red-tailed hawk (Buteo jamaicensis), red-shouldered hawk (Buteo lineatus) American kestrel (Falco sparverius).

Special status plant species that occur in specialized habitat within grasslands include coast rock-cress (Arabis blepharophylla), Presidio clarkia (Clarkia franciscana), Marin western flax (Hesperolinon congestum), adobe sanicle (Sanicula maritima), and San Francisco owl's clover (Triphysaria floribunda). Most of these species also occur in communities other than grassland, and are restricted to specific soil types, hydrologic regimes, elevation range and geographic distribution.

A variety of special status wildlife species are associated with grassland habitats of the city, including bay checkerspot butterfly (Euphydryas editha bayensis), mission blue butterfly (Icaricia icarioides missionensis), white-tailed kite (Elanus leucurus), and loggerhead shrike (Lanius ludovicianus).

Coastal Marsh and Estuaries

Coastal salt marshes around San Francisco Bay (including historically diked tidal marshes) are dominated by perennial pickleweed (Salicornia virginica), alkali heath (Frankenia salina), fat hen (Chenopodium album), marsh gumplant (Grindelia stricta var. angustifolia), saltgrass (Distichlis spicata) and other salt-tolerant plants that can withstand regular inundation or soil saturation. Tidal salt marshes often contain a network of sloughs and small channels that facilitate tidal reach into the marsh interior. These channels are subject to more frequent and deeper flooding, therefore support different plant species, such as smooth cordgrass (Spartina foliosa) and alkali bulrush (Scirpus maritimus). These communities are categorized by Holland (1986) as northern coastal salt marsh, coastal brackish marsh, and coastal freshwater marsh, in order of decreasing tidal effects and salinity. Within San Francisco County, remnant salt marshes, although small in size and altered from their pristine state, can still be found north of Pier 94 and at Pier 98, as well as in South Basin, India Basin, and the Islais Creek Channel (Wood 1998b).

There are few terrestrial animals in salt marshes, and few resident bird species. Raptors that are typical of Bay Area salt marsh habitats include northern harrier (Circus cyaneus), red-tailed hawk, and white-tailed kite. Migratory shorebirds that forage in the mudflats during low tide include black-necked stilt (Himantopus mexicanus), American avocet (Recurvirostra americana), and several sandpipers. During high tide, ducks that may be found in salt marsh environments include northern shoveler (Anas clypeata), American wigeon (Anas americana), northern pintail (Anas acuta), gadwall (Anas strepera), and canvasback (Aythya valisineria). Other common mammals in salt marsh habitats include California vole (Microtus californicus), house mouse (Mus musculus), and black-tailed jackrabbit (Lepus californicus).

Rare and endangered wildlife species that occur among the pickleweed and cordgrass include California clapper rail (Rallus longirostris obsoletus), California black rail (Laterallus jamaicensis coturniculus), western snowy plover (Charadrius alexandrinus nivosus), saltmarsh common yellowthroat (Geothlypis trichas sinuosa), long-billed curlew (Numenius americanus), and marbled godwit (Limosa fedoa). Salt marsh harvest mouse (Reithrodontomys raviventris) and salt marsh wandering shrew (Sorex vagrans halicoetes) may occur in areas with high quality emergent wetlands and adjacent upland environs. Rare plants include San Francisco gumplant (Grindelia hirsutula var. maritima), salt marsh owl's clover (Castilleja ambigua ssp. ambigua), and Point Reyes bird's beak (Cordylanthus maritimus ssp. palustris).

Freshwater and salt marshes are sensitive communities because of historic and continuing loss of wetland habitats from agricultural conversion, urbanization, and flood control development, and because they provide habitat for several special status species.

Riparian and Instream Aquatic Habitat

Historically, there were a number of generally small drainages that occurred primarily in the central and southeastern portions of San Francisco. With the exception of one, these drainages have all been filled or culverted and diverted into the City's stormwater and sewage system. Lobos Creek, which runs along the southwestern border of the Presidio, and the headwaters of the north fork of Islais Creek or Glen Canyon Creek, are the only creeks in San Francisco that remain aboveground.

Riparian plant communities are tree or shrub-dominated communities that occur along streams and rivers. Riparian forests, woodlands, and scrub are often separated from one another depending on the amount and density of tree canopy versus shrub canopy. Forests support a closed or nearly closed canopy of trees with variable understory, while woodlands have an open canopy of trees with an understory that is primarily grassy or herbaceous. Scrub is dominated by shrubs rather than trees. The composition and density of riparian vegetation is very much dependent upon the duration of flowing or near-surface water, the amplitude and periodicity of flow (brief, high velocity flows versus more sustained flows), and the texture of the substrate (cobbles, gravel, sand, silt, clay). Different reaches of a stream may support different types of riparian vegetation. Most remaining high-quality riparian vegetation is considered special status by the CDFG. Riparian vegetation along Lobos Creek, as classified by Holland (1986) consists of central coast arroyo willow riparian scrub and central coast live oak riparian forest (NPS, 2001) and coastal riparian forest made up of a coast live oak-madrone- California bay association is reported as occurring along Glen Canyon Creek.

Generally, within the urbanized portions of the Bay Area, riparian habitats often support diverse wildlife communities. Although diversity of plant species is often compromised in urban situations, multi-layered vegetation occurring along creeks and perennial water sources provide a variety of foods and microhabitats for wildlife. Mature willows and oaks, provide high-quality nesting habitat for wildlife, such as raptors and migratory songbirds. Cavity-nesting wildlife, such as the downy woodpecker (Picoides pubescens), northern flicker (Colaptes auratus), and bats require mature stands of trees. Vines, blackberries (Rubus spp.), blue elderberry (Sambucus mexicana), and oaks produce important fall and winter foods for birds and mammals. Common wildlife species that depend on the nectar, fruits and seeds of riparian plants include Anna's hummingbird (Calypte anna), spotted towhee (Pipilo maculatus), California towhee (Pipilo crissalis), raccoon (Procyon lotor), striped skunk (Mephitis mephitis), opossum (Didelphis marsupialis).

Riparian vegetation supports an abundance of insect prey that feed on foliage and stems during the growing season. These insects, in turn, support a high density of migratory and resident birds, including the Pacific-slope flycatcher (Empidonax difficilis), yellow warbler (Dendroica petechia), Townsend's warbler (D. townsendi), yellow-rumped warbler (D. coronata), warbling vireo (Vireo gilvus), common bushtit (Psaltriparus minimus), and Bewick's wren (Thyromanes bewickii). Raptors, such as sharp-shinned hawk (Accipiter striatus), Cooper's hawk (A. cooperii) and red-shouldered hawk (Buteo lineatus), nest in the high canopy and feed on the smaller birds and amphibians.

The federally threatened California red-legged frog (Rana aurora draytonii) still breeds in the upper reaches of many Bay Area riparian corridors, and in the lower reaches of select drainage systems and ponds. One of the greatest concentrations of this species occurs in the relatively undisturbed watershed drainages of the lower San Francisco Peninsula. While red-legged frogs no longer occur in San Francisco's streams, they can be found in lakes and ponds in Golden Gate Park and may be present in Lake Merced and, although recently undetected, in lakes and drainages at the Presidio (B. Pittman, pers. com., 2003). Red-legged frogs also occur throughout the Bay Area and, as discussed in the cumulative impacts section, could be subject to indirect impacts resulting from project induced development.

As described above, aquatic stream habitat has been virtually destroyed on the upper San Francisco Peninsula and, therefore, the region no longer supports anadromous fisheries.

Woodlands

Coast live oak woodlands are dominated by coast live oak (Quercus agrifolia), with toyon (Heteromeles arbutifolia), California bay (Umbellularia californica), and California buckeye (Aesculus californica) often occurring as associates. This plant community can still be found in small patches at the Presidio and on Yerba Buena Island (Wood 1998a), among other scattered locales within San Francisco. The understory is dominated by herbaceous vegetation and often consists of non-native grasses such as soft chess (Bromus mollis) and ripgut grass (Bromus diandrus), intermixed with native and non-native wildflowers including chickweed (Stellaria media), bedstraw (Galium aparine), mugwort (Artemesia douglasiana), fiesta flower (Pholistoma auritum), and miner's lettuce (Claytonia perfoliata). Where the tree canopy is dense, understory can consist almost exclusively of Algerian ivy (Hedera canariensis). The shrub layer of the understory, though sparse, can contain snowberry (Symphoricarpos albus), poison oak (Toxicodendron diversilobum), and California blackberry (Rubus ursinus).

Coast live oak woodland provides water, foraging, nesting, cover, and migrating and dispersal corridors for a variety of wildlife species. Insect eaters, such as dark-eyed junco (Junco hyemalis) are woodland foliage gleaners. Bark gleaner species, such as scrub jay (Aphelocoma coerulescens), Steller's jay (Cyanocitta stelleri), and northern flicker feed on insects as well as acorns. California towhee is the primary ground foliage gleaner in this habitat when it occurs in an urbanized setting. Cooper's hawk and sharp-shinned hawk are often associated with this habitat, where they hunt small birds. Mammals such raccoon and opossum take advantage of this productive habitat, as well as shrews (Sorex sp.) and California voles. Underneath the cover of fallen leaf litter, amphibians such as Pacific slender salamander (Batrachoseps attenuatus) and arboreal salamander (Aneides lugubris) can be found.

Special status plant species associated with woodland habitats are often also found in adjacent chaparral and scrub habitats. In San Francisco, these species may include: Franciscan thistle (Cirsium andrewsii), robust spineflower (Chorizanthe robusta var. robusta), fragrant fritillary (Fritillaria liliacea), large-flowered linanthus (Linanthus grandiflora), and Michael's rein-orchid (Piperia michaelii).

Special status wildlife species include those described for grassland and riparian habitats, forest-nesting raptors, and species such as tree swallow (Tachycineta bicolor), Bullock's oriole (Icterus bullockii), and several wood warblers, which are all protected under the Migratory Bird Treaty Act.

Eucalyptus and Other Non-native Groves

This vegetation community is usually monotypic, with only one species providing canopy and very little undergrowth; however, varying degrees of infestation are common in the Bay Area as eucalyptus groves establish dominance over and crowd out native plant communities. Structurally, eucalyptus (Eucalyptus sp.) create a dense, shady canopy. Volatile chemicals contained in the large amount of bark and leaf litter deposited by eucalyptus create poor growing conditions for most herbaceous and woody understory species, and may suppress the germination of native seeds. Where fire hazard management techniques have not been applied, the understory of this community consists of a thick layer of bark, leaves, and poison oak (where openings in the canopy allow sufficient light to penetrate to the grove floor), creating high fire hazards.

In addition to Eucalyptus groves, stands of Monterey pine (Pinus radiata) and Monterey cypress (Cupressus macrocarpa), which are native to the Monterey Peninsula but do not naturally occur this far north, were widely planted throughout the city. Stands of these species often have little understory due to the thick duff layers that can accumulate beneath the overstory. Groves or plantations of these non-native trees can be found throughout the city at the Presidio, on Mount Davidson, Glen Park, McLaren Park, Golden Gate Park, as well as most smaller city parks and golf courses.

These non-native forests offer important perching and roosting sites for a variety of avian species in the urbanized environment, with raptors often nesting in the groves. The lack of understory growth does not provide much habitat for insects and other invertebrates and, therefore, reptiles that prey upon them would not occur within this habitat. For this same reason, mammals would not regularly use this habitat except for cover and resting areas. However, Myotis bat species and California slender salamanders (Batrachoseps attenuatus) have been observed in this habitat. With the exception of nesting raptors, no special status plant or wildlife species are typically associated with non-native groves.

Freshwater Emergent Wetlands

Freshwater emergent wetland habitat encompasses seeps, seasonally inundated topographic depressions, and freshwater marshes. Freshwater seeps create seasonally or permanently moist soil and are dominated by perennial grasses, sedges (Carex spp.), and rushes (Juncus spp.). Seeps are most likely to occur in the City where hill cuts intersect the water table. Freshwater marshes occur around lake margins in the project region, including Lake Merced and Mountain Lake in the Presidio. Marsh communities are commonly dominated by cattail (Typha sp.) and bulrush (Scirpus sp.) and provide habitat for a number of both resident and migratory birds.

Fresh water marshes are typically one of the most productive habitats for wildlife because they offer water, food, and cover for a variety of species. Reptiles and amphibians typically found in this habitat include coast garter snakes (Thamnophis elegans) and Pacific tree frogs (Hyla regilla). Northern harriers (Circus cyaneus) and killdeer (Charadrius vociferus) may use these areas for foraging and nesting. Snowy egrets (Egretta thula), black-crowned night herons (Nycticorax nycticorax), and mallards (Anas platyrhynchos) also forage in this habitat. Mammals common around the upland fringes of these wetlands include meadow voles (Microtus sp.), which forage on insects attracted to the moist environment, and raccoons and striped skunks, which forage on bird eggs and invertebrates. This habitat also provides important foraging and watering areas for aerial and ground feeding insectivorous bats, such as Myotis species.

San Francisco Bay Aquatic Resources

The San Francisco Bay and Delta make up the Pacific Coast's largest estuary, encompassing roughly 1600 square miles of waterways and draining over 40 percent of the California's fresh water. In the estuary, the Sacramento and San Joaquin Rivers flow from Northern California's inland valleys into the Deltas winding system of islands, sloughs, canals and channels, before emptying into San Francisco Bay and the Pacific Ocean.

Salinity in the bay varies seasonally and is influenced by freshwater inflow from the Delta and tidal inputs from the Pacific Ocean. Salinity ranges from open ocean concentrations (approximately 30-33 parts per thousand) to less than half that amount in large estuaries during low tide and at peak spring flows. Tides in San Francisco Bay are semi- diurnal with two uneven highs and two uneven lows occurring during each lunar day (approximately 24.8 hours).

The marine environment of San Francisco Bay varies from intertidal mudflats to open water habitat; that is, areas of the Bay that occur below the low tide line (also known as subtidal habitat). Bottom sediments range from silts and clays to coarser sands and gravel in deep channels. Photosynthetic phytoplankton are the dominant plants in the open water areas, which along with zooplankton (which include larval and adult bivalves, copepods, barnacles, polychaete worms and other invertebrates) and ichthyoplankton, support a large array of benthic organisms, fish, and birds, as well as marine mammals that occur in the bay. Ichthyoplankton populations consist of eggs and larvae of commonly occurring fish species including staghorn sculpin (Leptocottus armatus), pacific herring (Clupea pallasii), and northern anchovy (Engraulis mordax). Both the number of species and overall abundance are usually highest in winter for most species.

The benthic (bottom dwelling) macroinvertebrate fauna in the bay is typical of soft- bottomed bays and estuaries and is dominated by polychaete worms, mollusks, and small crustaceans. Intertidal bivalves are chiefly represented by clams and mussels in San Francisco Bay mud bottomed salt marshes. These animals also serve to support the fish, birds, and marine mammals that occur in the estuary.

Eelgrass (Zostera marina) beds may occur near the footings of bridges in the transbay corridors, and is considered a sensitive habitat by CDFG. Eelgrass is an important habitat for many organisms and may influence benthic community structure by stabilizing sediments, providing forage and detritus food sources, creating a refuge and nursery for small organisms. Eelgrass beds also provide an important attachment substrate for including Pacific herring eggs (USFWS, 1994).

The open waters of San Francisco Bay are biologically rich in fish production, and provide an important recreational and commercial benefit to Bay Area residents. More than 100 species of fish are described from the San Francisco Bay system (USFWS, 1983). The majority of these are native species that live year-round in San Francisco Bay, though a few such as striped bass (Morone saxatilis) have been introduced. Anadromous fish use San Francisco Bay seasonally during their migrations to and from spawning grounds that are located throughout the Bay Area and in the California's Central Valley.

Common fish species in San Francisco Bay include topsmelt (Atherinops affinis), Pacific herring (Clupea pallasi), northern anchovy (Engraulis mordax), rock sole (Lepidosetta bilineata), English sole (Parophrys vetulus), jacksmelt (Atherinopsis californiensis), white croaker (Genyonemus lineatus)and shiner perch (Cymatogaster aggregata). The northern anchovy, topsmelt, and jacksmelt provide an important food source for piscivorous (fish eating) fish and birds. The Pacific herring fishery is closely monitored and regulated by CDFG and considered the most important remaining fishery in San Francisco Bay.

The two marine mammals most commonly found in San Francisco Bay are the California sea lion (Zalophus californianus) and the harbor seal (Phoca vitulina). Both species forage in the open waters of the Bay, and bask on exposed rocks, piers, or wharves throughout the Bay. Both species are protected by the Marine Mammal Protection Act.

Other special status animals that are known to use the Bay waters include gray whale (Eschrichtius robustus), California brown pelican (Pelicanus occidentalis californicus), and several fish species including coho salmon, steelhead trout, delta smelt, Pacific lamprey, and Sacramento splittail.

Policy and Regulation

The regulations and policies of various federal and state agencies (e.g., U.S. Army Corps of Engineers [Corps], U.S. Environmental Protection Agency [EPA], USFWS, National Oceanic and Atmospheric Administration [NOAA} Fisheries [formerly the National Marine Fisheries Service or NMFS], and CDFG) mandate protection of wetlands, special-status plant and wildlife species, and aquatic and terrestrial communities in the region. The Corps has primary federal responsibility for administering regulations that concern waters and wetlands, while the USFWS, National Marine Fisheries Service, and the CDFG have lead responsibility for determining potential project effects on federal- and state-listed species and other species of concern.

Federal Regulations

National Environmental Policy Act

The National Environmental Policy Act of 1969 (NEPA) was one of the first laws to establish a broad national framework for protecting the environment. Its purposes include: "To declare a national policy which will encourage productive and enjoyable harmony between man and his environment; [and] to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man." NEPA assures that all branches of federal government give proper consideration to the environment prior to undertaking major federal actions that could significantly affect the environment. NEPA compliance is performed through preparation of either an Environmental Assessment (EA) or Environmental Impact Statements (EIS), which assesses the likelihood of impacts from alternative courses of action.

Federal Endangered Species Act

Under the Federal Endangered Species Act (FESA), the Secretary of the Interior and the Secretary of Commerce have joint authority to list a species as threatened or endangered (16 United States Code [USC] 1533[c]). Pursuant to the requirements of FESA, an agency reviewing a proposed project within its jurisdiction must determine whether any federally listed or proposed species may be present in the project region, and whether the proposed project would result in a "take" [9] of such species. In addition, the agency is required to determine whether the project is likely to jeopardize the continued existence of any species proposed to be listed under FESA, or result in the destruction or adverse modification of critical habitat proposed to be designated for such species (16 USC 1536[3][4]). Project-related impacts to these species or their habitats would be considered significant in this EIR. The "take" prohibition of FESA applies to any action that would adversely affect a single member of an endangered or threatened species.

Proposed and Candidate Species for Listing as Endangered or Threatened

Proposed species for listing as endangered or threatened are granted limited protection under the act and must be addressed in Biological Assessments (under Section 7 of the act); proposed species otherwise have no protection from "take" under federal law, except emergency-listed species.[10] Candidate species are afforded no protection under the act. The U.S. Fish and Wildlife Service (USFWS) typically reviews project plans and species information to determine the effects of federal actions on a proposed or candidate species. Any recommendations to modify or abandon the project and/or undertake protective measures for proposed or candidate species are not mandatory on the federal agency conferring with the USFWS. The USFWS recommends that candidate species and species proposed for listing also be considered in informal consultation during a project's environmental review. This is recommended because, in the event that a species were to be listed during the design or construction phases of a project, new studies and restrictions could be imposed.

Migratory Bird Treaty Act and Bald Eagle Protection Act

The federal Migratory Bird Treaty Act (16 USC, Section 703, Supplement I, 1989) prohibits killing, possessing, or trading in migratory birds, except in accordance with regulations prescribed by the Secretary of the Interior. This act encompasses whole birds, parts of birds, and bird nests and eggs.

---

[9] "Take," as defined in Section 9 of the FESA, is broadly defined to include intentional or accidental "harassment" or "harm" to wildlife. "Harass" is further defined by the U.S. Fish and Wildlife Service as an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, and sheltering. "Harm" is defined as an act that actually kills or injures wildlife. This may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering.

[10] Note, however, that protection from "take" begins at this stage under state law.

The federal Bald Eagle Protection Act prohibits persons within the United States (or other places subject to U.S. jurisdiction) from "possessing, selling, purchasing, offering to sell, transporting, exporting or importing any bald eagle or any golden eagle, alive or dead, or any part, nest or egg thereof."

Marine Mammal Protection Act

The Marine Mammal Protection Act of 1972 (MMPA) was most recently reauthorized in 1994. The MMPA recognizes that certain species and populations of marine mammals are, or may be, in danger of extinction or depletion as a result of human activities and that such species or populations should be sustained at levels where they can continue to play a significant role in the marine ecosystem. The MMPA establishes a moratorium, with certain exceptions, on the taking of marine mammals in U.S. waters and by U.S. citizens on the high seas, and on the importing of marine mammals and marine mammal products into the United States.

Clean Water Act

The Clean Water Act is a 1977 amendment to the Federal Water Pollution Control Act of 1972, which set the basic structure for regulating discharges of pollutants to waters of the United States. Although the purpose of the act is primarily to maintain water quality for both human and environmental benefits, regulations developed pursuant to this act deal extensively with permitting of actions in wetlands. These regulations provide more specific protection for wetland habitats—most of which are important ecologically—than any other laws. The U.S. Environmental Protection Agency (EPA) has primary authority under the Clean Water Act to set standards for water quality and for effluents, but the U.S. Army Corps of Engineers (Corps) has responsibility for permitting dredge and fill in wetlands.

Rivers and Harbors Act of 1899

Section 10 of the Rivers and Harbors Act prohibits the obstruction or alteration of any navigable water of the United States. Under this act, the Corps must authorize any excavation or deposition of materials into such waters, or for any work that could affect the course, location, condition, or capacity of such waters.

Coastal Zone Management Act of 1972

This act established the authority for creating coastal zone management areas and the California Coastal Commission. Coastal zone management criteria are established by the Commission and must be followed by federal, other government, or private entities performing any activities within the coastal zone.

Federal Agencies Responsible for Managing Biological Resources

U.S. Fish and Wildlife Service

The mission of USFWS is to conserve, protect, and enhance the nation's fish and wildlife and their habitats for the continuing benefit of people. USFWS programs include management of wildlife sanctuaries, regulation of international and intrastate commerce related to wildlife, management of migratory species that move between states, wildlife management research, and identification and protection of endangered species.

NOAA Fisheries

The mission of National Oceanic and Atmospheric Administration Fisheries (formerly National Marine Fisheries Service or NMFS) is to protect, preserve, and restore the nation's marine resources. NOAA Fisheries fulfills their mission through promoting programs that focus on rebuilding and maintaining sustainable fisheries, promoting the recovery of protected species, and protecting and maintaining the health of coastal marine habitat.

State Regulations

California Environmental Quality Act

The intent of the California Environmental Quality Act (CEQA) is to maintain "high-quality ecological systems and the general welfare of the people of the state." It is the policy of the state to "prevent the elimination of fish or wildlife species due to man's activities, ensure that fish and wildlife populations do not drop below self-perpetuating levels, and preserve for future generations representations of all plant and animal communities and examples of the major periods of California history."

CEQA directs each state agency to consult with the California Department of Fish and Game (CDFG) on any project that is not statutorily or categorically exempt from CEQA. CEQA Guidelines (Section 15065a) indicate that impacts to rare, threatened, or endangered plants or animals are significant. This finding of significance can be applied directly to state- and federally listed species. Impacts to other species that may generally meet these criteria but are not officially listed may be considered significant by the lead agency (for an EIR), depending on the applicability of other laws (e.g., Migratory Bird Treaty Act) and the discretion of the agency. The CDFG interprets Lists 1A, 1B, and 2 of the California Native Plant Society's Inventory of Rare and Endangered Vascular Plants of California to consist of plants that, in a majority of cases, would qualify for listing as rare, threatened, or endangered. However, the determination of whether an impact is significant is a function of the lead agency, absent the protection of other laws. Projects subject to CEQA review must specifically address the potential impact of the listed species and provide mitigation measures, if the impact is significant.

California Endangered Species Act and CDFG

Under the California Endangered Species Act (CESA), the CDFG has the responsibility for maintaining a list of threatened and endangered species (California Fish and Game Code 2070). The CDFG also maintains a list of "candidate species," which are species formally noticed as being under review for addition to either the list of endangered species or the list of threatened species. In addition, CDFG maintains lists of "species of special concern," which serve as "watch lists." Pursuant to the requirements of CESA, an agency reviewing a proposed project within its jurisdiction must determine whether any state-listed endangered or threatened species could be present on the project site and determine whether the proposed project could have a potentially significant impact on such species. In addition, the CDFG encourages informal consultation on any proposed project that may impact a candidate species. Project-related impacts to species on the CESA endangered or threatened lists would be considered significant in this EIR. Impacts to "species of concern" would be considered significant under certain circumstances, discussed below.

California Native Plant Protection Act

State listing of plant species began in 1977 with the passage of the California Native Plant Protection Act (NPPA), which directed the CDFG to carry out the legislature's intent to "preserve, protect, and enhance endangered plants in this state." The NPPA gave the California Fish and Game Commission the power to designate native plants as endangered or rare and to require permits for collecting, transporting, or selling such plants. The California Endangered Species Act expanded upon the original NPPA and enhanced legal protection for plants. CESA established threatened and endangered species categories, and grandfathered all rare animals—but not rare plants—into the act as threatened species. Thus, there are three listing categories for plants in California: rare, threatened, and endangered.

California Coastal Act and Coastal Commission

The California Coastal Commission was established by voter initiative in 1972 (Proposition 20) and made permanent by the legislature in 1976. The mission of the Commission, as the lead agency responsible for carrying out California's coastal management program, is to plan for and regulate development in the coastal zone consistent with the policies of the California Coastal Act. The Commission is also one of two designated state coastal management agencies established for the purpose of administering the federal Coastal Zone Management Act in California. The Bay Conservation and Development Commission (BCDC) has authority over federal activities and federally licensed or assisted activities within San Francisco Bay, many of which are not otherwise subject to state control. The California Coastal Commission has the same authority over federal activities and federally licensed or assisted activities elsewhere in the California coastal zone.

The California Coastal Commission manages protection of biological resources through a permitting process for all projects in the coastal zone. The Commission has unusually broad authority to regulate development in the coastal zone, and a permit is required for any project that might change the intensity of land use in the coastal zone.

Biological Resources Protected by Statute and Policy

Special-Status Natural Communities

Special-status natural communities are identified as such by CDFG Natural Heritage Division. These communities include those that are both naturally rare and those that have been greatly diminished through changes in land use. The CDFG tracks 135 such natural communities in the same way that it tracks occurrences of special-status species: information is maintained on each site in terms of its location, extent, habitat quality, level of disturbance, and current protection measures. The CDFG is mandated to seek the long-term perpetuation of the areas in which these communities occur. In some cases, these areas have been established as protected reserves. There is no statewide law that requires protection of all special-status natural communities, but CEQA requires consideration of the potential impacts of a project to biological resources of statewide or regional significance.

Special-Status Plant and Wildlife Species

As described above in the setting information, a number of species known to occur in San Francisco are accorded "special status" because of their recognized rarity or vulnerability to habitat loss or population decline. Some of these species are listed and receive specific protection defined in federal or state endangered species legislation. Other species have not been formally listed as threatened or endangered, but have been designated as "rare" or "sensitive" on the basis of adopted policies and expertise of state resource agencies or organizations with acknowledged expertise, or policies adopted by local governmental agencies such as counties, cities, and special districts to meet local conservation objectives. These species are referred to collectively as "special-status species" following a convention that has developed in practice but has no official sanction. Special-status species are protected by the following legislation and policies:

- The California Native Plant Protection Act (California Fish and Game Code 1900 et seq.) protects endangered and "rare" species, subspecies, and varieties of plants.
- The California Endangered Species Act lists plants and wildlife as threatened or endangered (California Fish and Game Code 2070).
- The Federal Endangered Species Act (FESA), the Secretary of Commerce, and the Secretary of the Interior list plants and wildlife as threatened or endangered (16 USC 1533[a]; 16 USC 1533[a] [2]; 16 USC 1533 [c] [1]).
- The California Environmental Quality Act (CEQA), Guidelines Section 15380 includes plants and wildlife that may be considered rare or endangered if the species meets certain specified criteria.
- The California Native Plant Society designates rare, threatened, or endangered plants as List 1 and List 2, and plants about which more information is needed and plants with limited distributions as List 3 and List 4.

- The California Department of Fish and Game (CDFG) designates plants and wildlife as "species of special concern" and protects the destruction of nests and eggs of any bird (Section 3503).
- The federal Bald Eagle Protection Act prohibits persons within the United States (or places subject to U.S. jurisdiction) from "possessing, selling, purchasing, offering to sell, transporting, exporting or importing any bald eagle or any golden eagle, alive or dead, or any part, nest, or egg thereof."
- The Migratory Bird Treaty Act (16 USC, Section 703, Supplement I, 1989) prohibits killing, possessing, or trading of migratory nongame birds.
- The California Fish and Game Code (Section 3503.5, 1992) protects birds of prey from unlawful take, possession, or destruction of any birds in the order Falconiformes or Strigiformes (birds of prey) and prohibits the possession or destruction of the nests or eggs of any such bird.
- The California Fish and Game Code (Section 3511 [birds], Section 5050 [reptiles and amphibians], and Section 4700 [mammals]) designates certain wildlife species as fully protected in California.

Protected Plant and Wildlife Areas

The City and County of San Francisco has established parklands that sustain wildlife resources. There are other quasi- and non-governmental organizations that oversee the management and protection of critical plant and wildlife communities, including the San Francisco Public Utilities Commission, National Audubon Society, and California Native Plant Society.

Wetlands

Wetlands are ecologically productive habitats that support a rich variety of both plant and animal life. The importance and sensitivity of wetlands has increased with the recognition of their value as recharge areas and filters for water supplies. Within California, approximately 95 percent of the state's historic wetlands have been converted to other land uses. An estimated 5 million acres of wetlands were present in California in the 1780s; by the 1980s, the acreage of wetlands in California had been reduced to only 450,000 acres. The loss of wetlands has been pronounced in the Bay Area because of the intense diking of shoreline wetlands in the Delta for agriculture as well as for salt production throughout San Francisco Bay, and as a result of hydraulic mining operations in the mid-1800s that lasted until at least the late 1800s.[11]

In a jurisdictional sense, there are two definitions of a wetland, one definition adopted by federal agencies and a separate definition adopted by the State of California. Both definitions are presented below.

---

[11] U.S. Geological Survey: http://sfbay.wr.usgs.gov/access/sanpablobay/bathy/home.html.

Federal Wetland Definition. Wetlands are a subset of waters of the United States and receive protection under Section 404 of the Clean Water Act. The term "waters of the United States" as defined in the Code of Federal Regulations (33 CFR 328.3[a]; 40 CFR 230.3[s]) includes:

1. All waters which are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide;
2. All interstate waters including interstate wetlands. (Wetlands are defined by the federal government [CFR, Section 328.3(b), 1991] as those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.);
3. All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation, or destruction of which could affect interstate or foreign commerce including any such waters:
   - which are or could be used by interstate or foreign travelers for recreational or other purposes; or
   - from which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or
   - which are used or could be used for industrial purposes by industries in interstate commerce.
4. All impoundments of waters otherwise defined as waters of the United States under the definition;
5. Tributaries of waters identified in paragraphs (1) through (4);
6. Territorial seas; and
7. Wetlands adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs (1) through (6).
8. Waters of the United States do not include prior converted cropland. Notwithstanding the determination of an area's status as prior converted cropland by any other federal agency, for the purposes of the Clean Water Act, the final authority regarding Clean Water Act jurisdiction remains with EPA [328.3(a)(8) added 58 CFR 45035, August 25, 1993].

The regulations and policies of various federal agencies (e.g., the Corps, U.S. Department of Agriculture [USDA], NRCS (Natural Resources Conservation Service), EPA, USFWS, NOAA Fisheries) mandate that the filling of wetlands be avoided to the extent possible. The Corps has primary federal responsibility for administering regulations that concern wetlands within the area. The Corps acts under the authority of the Clean Water Act (Section 404), which governs specified activities in "waters of the United States," including wetlands.

California Wetland Definition. Unlike the federal government, the CDFG has adopted the Cowardin et al. (1979) definition of wetlands:

> Wetlands are lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface of the land or is covered by shallow water. For purposes of this classification, wetlands must have one or more of the following three attributes: (1) at least periodically, the land supports predominantly hydrophytes (at least 50% of the aerial vegetative cover); (2) the substrate is predominantly undrained hydric soil; and (3) the substrate is nonsoil and is saturated with water or covered by shallow water at some time during the growing season of each year.

Under normal circumstances, the federal definition of wetlands requires all three wetland identification parameters to be met, whereas the Cowardin definition requires the presence of at least one of these parameters. For this reason, identification of wetlands by CDFG consists of the union of all areas that are periodically inundated or saturated, or in which at least seasonal dominance by hydrophytes may be documented, or in which hydric soils are present. The CDFG does not normally have direct jurisdiction over wetlands unless they are subject to jurisdiction under Streambed Alteration Agreements or they support state-listed endangered species.

Regulation of Activities in Wetlands.

The regulations and policies of various federal agencies mandate that the filling of wetlands be avoided unless it can be demonstrated that no practicable alternatives exist. The Corps has primary federal responsibility for administering regulations that concern waters and wetlands in the San Francisco region. In this regard, the Corps acts under two statutory authorities, the Rivers and Harbors Act (Sections 9 and 10), which governs specified activities in "navigable waters," and the Clean Water Act (Section 404), which governs specified activities in waters of the United States, including wetlands. The Corps requires that a permit be obtained if a project proposes placing structures within navigable waters and/or alteration of waters of the U.S. below the ordinary high-water mark in nontidal waters. The EPA provides the primary criteria for evaluating the biological impacts of Corps permit actions in wetlands.

The state's authority in regulating activities in wetlands and "waters" at the site resides primarily with the CDFG and the State Water Resources Control Board (SWRCB). In addition, the California Coastal Commission has review authority for wetland permits within its planning jurisdiction. The CDFG provides comment on Corps permit actions under the Fish and Wildlife Coordination Act. CDFG is also authorized under the California Fish and Game Code, Sections 1600-1607, to develop mitigation measures and enter into a Streambed Alteration Agreement with applicants that propose a project that would obstruct the flow or alter the bed, channel, or bank of a river or stream in which there is a fish or wildlife resource, including intermittent and ephemeral streams. The SWRCB, acting through the nine Regional Water Quality Control Boards, must certify that a Corps permit action meets state water quality objectives (Section 401, Clean Water Act).

3.4.2 IMPACTS AND MITIGATION MEASURES

Criteria of Significance

This EIR uses the following criteria to assess whether the proposed Expenditure Plan would have significant adverse effects on biological resources. Impacts would be considered significant if one or more of the following occurs:

- **Criterion 1:** Disturbance of natural vegetation, potentially resulting in disruption of wildlife corridors, adverse effects on native wildlife nurseries, or impacts on wildlife movement or designated sensitive plant communities.
- **Criterion 2:** Construction near or adjacent to wetlands or aquatic resources(i.e., riparian, riverine, coastal, or wetland), causing disturbance to these resources.
- **Criterion 3:** Disturbance of special-status species, as a result of projects occurring near or within the designated or known habitat of a special-status plant or animal species.
- **Criterion 4:** Conflicts with adopted local resource protection and conservation plans or with any local policies or ordinances protecting natural resources, such as a city or county tree ordinance, or with the provisions of other approved local, regional, or state habitat conservation plan.

Method of Analysis

For this impact assessment, the locations of projects included in the Expenditure Plan were compared with locations of sensitive species and important habitat areas. Potential impacts were determined by evaluating whether proposed transportation improvements would occur within the potential range of a special-status species, whether the projects would directly encroach upon an area of ecological significance, or whether the projects could involve the filling of wetlands. Impacts would be more likely to occur where projects could have an effect upon ecologically sensitive or significant areas. Projects involving significant ground-disturbing activity were reviewed with the closest scrutiny, including road widenings, rail extensions, interchange projects, and bridges. Resources used to identify these potential impacts included the California Natural Diversity Database, city and county master plans, published environmental impact reports, or other CEQA/NEPA documents. In some cases, the exact project alignments, locations, or other design details are not known because the projects are in the early stages of planning or development. The analysis therefore assesses only the potential for biological impacts. Laws and regulations protecting special-status species, areas of ecological significance, and wetland resources are effective incentives for project proponents to design alternatives that either avoid or substantially reduce impacts on these resources.

Projects that would not expand transportation-dedicated lands were assumed to have minimal potential biological impacts. These projects include signal and traffic operational improvements, rail extensions along existing rights-of-way, and road widenings in urban areas or within existing rights of way. However, it is recognized that CEQA may require more detailed evaluations on a project-by-project basis to determine the exact resources found within proposed road or rail alignments. Since the specific details of many projects are not yet known, this assessment identifies general locations of potential adverse effects. These locations correspond to areas with substantial remaining open space within the city, generally parks or mountain tops, that contain remnants of natural habitat, such as coastal scrub, freshwater marsh, or groves of non-native trees, suitable for supporting special status plants and wildlife. Areas mapped include the Presidio, Twin Peaks, Mount Davidson, Lake Merced, Fort Funston, Glen Canyon Park, and McLaren Park.

Summary of Impacts

Project-specific studies will be required to determine significant impacts to biological resources resulting from implementation of certain specific transportation improvements in the Expenditure Plan, such as the Doyle Drive reconstruction and the Illinois Street Bridge Project. These projects occur in areas generally known to support aquatic resources, natural habitat and/or special status species. General impacts are identified in this document based on the location of proposed projects and the known distribution of sensitive biological receptors. Implementation of certain transportation improvements in the Expenditure Plan could increase roadway or railway footprints in certain areas of San Francisco and could incrementally impact adjacent sensitive resource areas. Projects located near wetland habitats, sensitive natural communities, or near known populations of special-status plant or wildlife species are most likely to impact biological resources. However, many of the projects and programs included under the Expenditure Plan, such as the LRT and BRT improvements, will occur in completely urbanized areas and are not expected to impact biological resources.

Short Term Impacts

Short-term impacts resulting from completion of Expenditure Plan transportation improvements include the temporary loss and/or degradation of wetlands or other sensitive natural communities and temporary disturbance of special-status plant and wildlife species. Such impacts could result from construction-related disturbances, such as noise or vibration, or from construction-related erosion, accidental spills, or other indirect project effects.

Long Term Impacts

Long-term effects on both common and special-status plant and wildlife species found in sensitive natural communities may occur, due, in part, to the difficulty in constructing successful habitat replacement for natural areas such as wetlands, riparian forests, and native grasslands. At least two proposed transportation improvements in the Expenditure Plan have been identified within or adjacent to coastal salt marsh and/or estuarine habitats. These projects, while generally not expected to impact habitat, could potentially result in significant long-term impacts to special-status plant and wildlife species as a result of loss or degradation of habitat, accidental spills or fill of jurisdictional waters or wetlands. Other proposed transportation projects could also contribute incrementally to habitat loss for special-status plant or wildlife species.

Impacts and Mitigation Measures

Impact 3.4-a Transportation improvements in the Expenditure Plan could adversely affect wetlands and other aquatic resources. (Significant, mitigable)

Impacts include the temporary or permanent loss of wetlands or wetland functioning, incremental degradation of wetland habitats, or segmentation of wetland habitat. Wetland resources in the immediate vicinity of proposed transportation improvements include relatively small, isolated roadside areas, small streams, and vegetated shorelines. Any fill of jurisdictional wetland habitats associated with proposed transportation improvements would be considered a significant mitigable impact.

In addition to the direct loss of habitat, implementation of proposed transportation projects could increase the potential for stormwater runoff to carry a variety of pollutants into wetlands, streams, and San Francisco Bay. Construction runoff often carries grease, oil, and heavy metals (due to ground disturbance) into natural drainages and city stormwater systems. Furthermore, particulate materials generated by construction could be carried by runoff into natural waterways and could generate sedimentation in the few remaining streams in San Francisco and the Bay.

Mitigation Measure

B-1 At the time of project certification, project sponsors shall agree to comply with mitigation measures to protect jurisdictional waters and other sensitive habitat, as well as special-status plant and wildlife species. This requirement obligates project sponsors to implement measures that avoid, minimize, and compensate for significant impacts sensitive biological resources within or adjacent to the project area. In accordance with guidelines of the Army Corps of Engineers (Corps), the Environmental Protection Agency (EPA), U.S. Fish and Wildlife Service (USFWS), and California Department of Fish and Game (CDFG), a goal of “no net loss” of wetland acreage and value will be implemented, wherever possible, through avoidance of the resource. Mitigation for wetlands impacts would be based on project-specific wetland mitigation plans, subject to approval by the Corps and commenting agencies. Mitigation for placing fill in wetlands would be partially achieved by avoiding wetlands, and by minimizing fill where avoidance is not feasible.

Significance After Mitigation

Avoidance, compensatory restoration, or creation of new wetland communities to offset the conversion of wetlands for proposed transportation improvements would achieve “no net loss” of wetland acreage and value. Implementing the above mitigation on a site-by-site basis, where necessary, would reduce project effects to a less-than-significant level.

Impact 3.4-b Transportation improvements in the Expenditure Plan could cause substantial disturbance of biologically unique or sensitive communities, including CDFG-recognized protected plant communities and other habitat important to special

status species, such as Eucalyptus and Monterey pine groves. (Significant, mitigable)

Proposed transportation projects located within or adjacent to sensitive plant communities could result in temporary or permanent loss or degradation of such communities which could, additionally, contribute to an incremental loss of these community types. State-protected vegetation or natural communities remaining in San Francisco include, among others central dune scrub, northern coastal bluff scrub, freshwater seeps, northern coastal salt marsh, coastal freshwater marsh, central coast arroyo willow scrub, serpentine chaparral and prairie, and eelgrass beds (Holland, 1986).

Mitigation Measure

B-2 In accordance with guidelines of the Corps, EPA, USFWS, and CDFG, a goal of "no net loss" shall be achieved through avoidance of the resource, or through creation or restoration of habitat of superior or comparably quality. Where applicable, projects shall conform to the provisions of special area management or restoration plans such as the Baylands Ecosystem Habitat Goals report (Goals Project 1999) or the Presidio Vegetation Management Plan (NPS, 2001).

Significance After Mitigation

Avoidance, compensatory rehabilitation or restoration, or creation of sensitive natural communities, in conjunction with proposed transportation improvements could achieve the minimum overall goal of "no net loss" of sensitive community acreage and value. Implementing the above mitigation on a site-by-site basis would reduce project effects to a less-than-significant level.

Impact 3.4-c ***Proposed transportation improvements in the Expenditure Plan could have deleterious impacts on special-status plant and wildlife species identified as endangered, threatened, candidate, and/or special status by the CDFG or USFWS. (Significant, mitigable)***

For the purposes of this analysis, unless shown to be absent, special-status species are presumed present in all areas that provide at least moderate quality habitat. A focused list of special-status species with the potential to occur in San Francisco project areas was presented previously in this section in Table 3.4-1. Potential effects on special-status species include the temporary removal of vegetation and habitat, direct mortality from equipment, loss or degradation of designated critical habitat, entrapment in open trenches, and general disturbance due to noise or vibration during pile-driving, earthmoving, and other construction activities. Additional impacts to special-status species could occur as a result of habitat fragmentation, increased human intrusion, erosion, introduction of invasive species, disruption of migratory corridors, sedimentation of aquatic habitat, and filling and disturbance of aquatic habitats. Such impacts would be considered significant mitigable impacts.

Mitigation Measures

B-3 Project sponsors shall demonstrate compliance with the provisions of CEQA and NEPA, as applicable, prior to project approval by the SFCTA. At the time of project certification, project sponsors shall agree to comply with mitigation measures to protect special-status plant and wildlife species. This requirement obligates project sponsors to implement measures that avoid, minimize, and compensate for significant impacts to special-status species and their habitat. Typical measures that may be included by project sponsors include:

- In support of CEQA, NEPA, and CDFG and USFWS permitting processes for individual Expenditure Plan transportation projects, biological and wetland surveys shall be conducted as part of the environmental review process to determine the presence and extent of sensitive habitats and/or species in the project vicinity. Surveys shall follow established methods and shall be undertaken at times when the subject species is most likely to be identified. In cases where impacts to state- or federal-listed plant or wildlife species are imminent, formal protocol-level surveys may be required on a species-by-species basis to determine the local distribution of these species. Consultation with the USFWS shall be conducted at an informal level for transportation projects that could adversely affect federal candidate, threatened, or endangered species to determine the need for further consultation or permitting actions.
- Project designs shall be reconfigured, whenever possible, to avoid sensitive wetland or other sensitive communities and to avoid temporary and permanent disturbances to wetland and riparian corridors. Projects shall minimize ground disturbances and construction footprints near sensitive areas to the extent practicable.
- To the extent practicable, project activities in the vicinity of sensitive resources shall be completed during the period that best avoids disturbance to plant and wildlife species present (e.g., February 1 through August 31 for breeding birds or April 15th through October 15th for work in and around streams).
- Individual projects shall minimize the use of in-water construction methods in areas that support sensitive fish species, especially when fish are present. In the event that equipment needs to operate in any watercourse with flowing or standing water, a qualified biological resource monitor shall be present at all times to alert construction crews to the possible presence of nesting birds, California red-legged frog, or other aquatic species at risk during construction operations.
- If special status plants are identified in the vicinity of proposed construction activities and these plants could be avoided by construction, biological monitors shall locate and fence off sensitive resources before construction activities begin and, where required, shall inspect areas to ensure that barrier fencing, stakes, and setback buffers are maintained during construction. For work sites located adjacent to special-status plant or wildlife populations, a biological resource education program shall be provided for construction crews and contractors (primarily crew and construction foremen) before construction activities begin.

- Biological monitoring shall be particularly targeted for areas near identified habitat for federal and state-listed species, and a "no take" approach shall be taken whenever feasible during construction near special-status plant and wildlife species.
- If special status plants are identified within proposed construction areas and avoidance of these areas is infeasible, CDFG and USFWS, as applicable, would be consulted to develop an acceptable plan for transplant, salvage, cultivation, or re-establishment of the species at suitable sites.
- Topsoil would be salvaged and stored prior to construction, then re-spread following construction and implementation of other appropriate site restoration measures (such as final grading, soil scarification, and erosion control). In situations where post-construction monitoring indicates that this technique has not resulted in successful re-establishment of special status plants, then seeds or cuttings of the species shall be gathered from nearby populations, and shall be used in a cultivation and planting program that is appropriate for the horticultural requirements of the species. Re-introduction of the plant would be accomplished through sowing of seeds or planting of cultivated plants in the construction area or in another suitable location for which long-term site protection can be ensured. The restored area shall be comparable in size, soil type, exposure, dominant vegetation, and other critical habitat elements to the source population. Control of exotic weeds shall be implemented to prevent degradation of the habitat for native species. All components of the revegetation plan shall be subject to approval of CDFG or USFWS.

Significance After Mitigation

Since proposed transportation improvements are generally concentrated within fully urbanized areas and along existing transportation corridors, overall habitat loss and fragmentation will be lower than if projects were to occur in previously undeveloped or undisturbed areas. The implementation of the above mitigation measures will eliminate or reduce the impacts of individual projects to a less-than-significant level.

Impact 3.4-d Construction activities could adversely affect special status nesting raptor species. (significant, mitigable)

Nesting habitat for several raptor species occurs throughout the city and may occur near several proposed transportation projects. These species use eucalyptus and other tall trees throughout San Francisco for nesting purposes, especially when such trees are located near foraging habitat, such as riparian habitat, grasslands, or scrub habitat. Construction disturbance during the breeding season could result in the incidental loss of fertile eggs or nestlings, or otherwise lead to nest abandonment. Disturbance that causes nest abandonment and/or loss of reproductive effort is considered a "take" by the CDFG and would be considered a significant mitigable impact. Red-tailed hawk, red-shouldered hawk, sharp shinned hawk, American kestrel, barn owl, great horned owl, and peregrine falcon (formerly listed as federally endangered, now delisted) are known to breed in San Francisco (San Francisco Field Ornithologists, 2002). Additionally, Cooper's hawk often breed in urban habitats and may occur in the city.

Mitigation Measures

B-4 Project sponsors shall demonstrate compliance with the provisions of CEQA and NEPA, as applicable, prior to project approval by the SFCTA. At the time of project certification, project sponsors shall agree to comply with mitigation measures to avoid and minimize impacts to nesting raptors. Typical measures that may be included by project sponsors include:

- To avoid and minimize impacts to nesting raptors, preconstruction surveys would be performed prior to initiating construction activities during the breeding season (February 1 through August 31). If it is determined that young have fledged and are self-sufficient, no further mitigation would be required.
- To avoid and minimize potential impacts to nesting raptors, a no-disturbance buffer zone would be established around active nests during the breeding season. The size of individual buffers could be adjusted based on an evaluation of the site by a qualified raptor biologist. Site evaluations and buffer zone adjustments would be done in conjunction with consultation with CDFG or according to CDFG protocols for specific species, when these exist.

Significance After Mitigation

Implementing the above mitigation measures would allow early recognition of nesting raptors in and near work areas and avoid impacts to these species. Following implementation of seasonal avoidance methods, this impact is considered less than significant.

Impact 3.4-e ***Construction activities could impact nonlisted nesting bird species protected under the federal Migratory Bird Treaty Act and the California Fish and Game Code, as well as bat species of concern. (Significant, mitigable)***

Nesting habitat for nonlisted birds protected under the federal Migratory Bird Treaty Act and the California Fish and Game Code, as well as for a number of bat species occurs in woodlands, riparian areas, and landscaped areas, and likely occurs near some Expenditure Plan projects. Construction disturbance during the breeding season could result in the incidental loss of fertile eggs or nestlings, or otherwise lead to nest abandonment, and would be considered a significant mitigable impact.

Mitigation Measure

B-5 Project sponsors shall demonstrate compliance with the provisions of CEQA and NEPA, as applicable, prior to project approval by the SFCTA. At the time of project certification, project sponsors shall agree to comply with mitigation measures to avoid impacts to nesting bird species protected under the federal Migratory Bird Treaty Act. Typical measures that may be included by project sponsors include:

- Concurrent with surveys described in Impact 3.4-d, general breeding bird and bat surveys shall also be performed. The above regulations combine to protect nearly every bird species that occurs in California on either a resident or migratory basis. The only species not afforded such protection are the English sparrow and the European starling. In addition, many bat species are designated as species of special concern by the federal government. If protected breeding birds or bats are detected during surveys, a buffer zone shall be established around active nesting or bat roosting sites in consultation with CDFG and USFWS.

Significance After Mitigation

This mitigation measure would be expected to reduce any potentially significant impacts on nonlisted nesting bird species protected under the federal Migratory Bird Treaty Act and the California Fish and Game Code to a less-than-significant level if incorporated by project sponsors.

Impact 3.4-f ***Construction that occurs within or adjacent to habitat that supports special status invertebrates may disrupt these species at vulnerable stages of their life cycle, or may eliminate host plants that are essential for completion of their life cycle. (Significant, mitigable)***

Lupine and other plant species which support listed butterflies may be present within the project area. Project-specific biological surveys will identify potential habitat for special status invertebrates in the project area. Destruction of these plants by construction equipment or vehicles may result in direct mortality of the larvae of these species and may remove host plants that are essential to the life cycle of these invertebrates.

Mitigation Measures

B-6 Project sponsors shall demonstrate compliance with the provisions of CEQA and NEPA, as applicable, prior to project approval by the SFCTA. Typical measures would include:

- Prior to construction activities within or adjacent to potential habitat for special status invertebrates, a qualified wildlife biologist will conduct a survey for host plants. Wherever feasible, plants that may support special-status invertebrates during any stage of their life cycle would be fenced off and their removal avoided. No encroachment into the fenced areas would be permitted. The fencing would remain in place until all subsequent construction activities in the vicinity was completed.
- If avoidance of host plants is not feasible, a plan to avoid or reduce adverse impacts to sensitive invertebrate species will be developed through informal consultation with CDFG and USFWS, if appropriate.

Significance After Mitigation

The mitigation measures outlined above would be expected to reduce this potentially significant impact to a less-than-significant level if incorporated by project sponsors.

Impact 3.4-g ***Construction activities could cause mortality of common wildlife species. (Less than Significant)***

Direct impacts to common wildlife species include both mortality of resident species and habitat loss and degradation. Mortality would include road-kills of fence lizards and other common reptiles and small mammals. Habitat degradation associated with temporary construction-related disturbances may include displacement of animals due to construction noise and decreased water quality from oil and grease constituents.

No mitigation is required for this impact; however, the implementation of feasible mitigation measures for Impacts 3.4-a and 3.4-b above would further reduce this project impact.

Impact 3.4-h ***Construction activities have the potential to conflict with provisions of federal, state, and local resource protection and conservation plans, as well as with policies and regulations established by land management agencies to protect biological resources occurring on lands within their jurisdiction. (less than significant)***

During development of project-specific analyses the project proponent would review federal, state, and local city and county ordinances, policies, and conservation plans and comply with all applicable requirements. This may include submittal of plans for review and approval by federal, state, and local agencies. Additionally, construction activities may take place on lands regulated by federal, state, regional, and local land management agencies. These lands may include national or state parks and recreation areas with specific regulations regarding conservation and management of biological resources. Construction activities on such lands would be subject to all applicable regulations or policies of the land management agencies with jurisdictional authority over the area in question. Therefore, this impact would be less than significant.

Mitigation Measures

Since project development would incorporate applicable federal, state, and local provisions, policies, and regulations regarding natural resources no mitigation would be required.

3.5 CULTURAL RESOURCES

In the context of this EIR, cultural resources are described as the material remains identified with either prehistoric inhabitants of the area (any time prior to the arrival of the Spanish in the latter half of the 18th century) or with the historic inhabitants. The historic period, as defined by CEQA guidelines, is the period beginning with the arrival of the Spanish, continuing up to 45 years ago.

3.5.1 SETTING

The San Francisco area's moderate climate combined with the abundant natural resources of both land and the bay, have supported human habitation for several thousand years Before Present (BP). Some theories suggest that the prehistoric bay and river margins were inhabited as early as 10,000 years ago. (EIP Associates, 1993) Rising sea levels, the formation of the San Francisco Bay, and the resulting filling of inland valleys have covered these early sites on the San Francisco peninsula. Existing evidence indicates the presence of many village sites from at least 5,000 years BP in the region. The arrival of Native Americans into the Bay Area is associated with documented cultural resources from circa 5,500 BP. (U.S. Dept of Interior, 1990)

Six different groups of Native population, identified by their language, lived within the Bay Area, including Coastanoan, Eastern Miwok, Patwin, Coast Miwok, Pomo and Wappo. These Native populations periodically increased between 5,000 BP and the arrival of the Spanish in the late 18th century. Native villages and campsites were inhabited on a temporary basis and are found in several ecological niches due to the seasonal nature of their subsistence base. Remains of these early peoples indicate that main villages, seldom more than 1,000 residents, were usually established along water courses and drainages. Remains of satellite villages have been found in areas used for procurement of food or other resources. By the late 1760s about 300,000 Native Americans lived in California.

Historic Periods

Prehistoric Resources

Dense concentrations of Native American archaeological sites occur along the historic bay margins of San Francisco. In addition, archaeological sites have also been identified in the following environmental settings:

- Near sources of water, such as vernal pools and springs;
- Along ridge tops and on midslope terraces;
- At the base of hills and on alluvial flats.

Remains associated with a Native American site may include chert or obsidian flakes, projective points, mortars and pestles, and dark friable soil containing shell and bone dietary debris, or human burials.

The Early Missions – Circa 1760 to 1790

The arrival of the Spanish and the development of the mission system in the latter half of the 18th Century permanently disrupted the indigenous societies flourishing in the area. The San Francisco Mission (Mission San Francisco de Asis or Mission Dolores) and the Presidio (Yerba Buena) were founded in 1776. Both the Mission Santa Clara and the Pueblo de San Jose de Guadalupe were founded in 1777 in Santa Clara County. The introduction of the infrastructure necessary to maintain the missions caused historic alterations to the landscape. The early Native American settlements were abandoned and replaced with cultivated orchards, productive agricultural land, grazing, and housing, outposts, and military support for the missions. These uses combined with the clearing of woodlands for fuel and lumber caused rapid changes to the natural environment. Native vegetation became displaced by imported grasses and plants spread by the settlers and their livestock.

From the Mission Era to the Gold Rush – Circa 1790 to 1847

After the Mexican revolt against Spain in 1822, California lands came under Mexican rule. Large tracts of land, including the former missions, were granted to individual owners. Agriculture, grazing, and mining activities increased, leading to the establishment of more permanent settlements and urban centers. These changes accelerated the degree of physical change occurring to the natural landscape. It is from this era that most of the historic ranch lands and associated living quarters and operational structures originate. It is also during this era that San Francisco became a transportation hub, shipping hides and other local raw materials to the manufacturing centers of New England.

The Gold Rush – 1847 to 1860

The discovery of gold and ensuing "gold rush" in the late 1840s brought thousands of prospectors and settlers into California. The Bay Area became the gateway to the gold of the Sierra Nevada. The conveyance of people, mining equipment, and food to the gold fields established some of the transportation corridors still in use today. Rapid growth occurred in several of the Bay Area's fledgling cities, with the focus on San Francisco as a shipping and financial center. Today, the structures and sites from this remaining period are often considered to be of historic significance.

The Agricultural Era – circa 1860-1900

The economic engine created by the gold rush was supplanted by increased agricultural production. Inland valleys were plowed for wheat, fruit, and vegetable cultivation, the transport of which was facilitated by the completion of the intercontinental railroad to San Francisco by 1888. The railroad's arrival to San Francisco assured the Bay Area's continued prominence as an economic and population center for the West in general and for California. The buildings, structures and objects that are associated with the aforementioned industries, irrigation and transportation of this period may be of historic significance.

The Manufacturing Era - circa 1900 - 1950

The economic base of the Bay Area continued to grow and diversify throughout the 1900s. Urban areas continued to grow in accordance with transportation corridors. The rail lines of the early 1900s supported new development along their routes, with residential and business centers at their stops. The development of the automobile and subsequent emphasis on roadway construction allowed population and economic centers to develop independent of rail corridors and at greater and greater distances from one another. Cultural resources from this period could include sites and structures associated with industrial development (i.e. maritime and railroad industries) and with prominent citizens of the time.

The Post-War Era - 1950s to Present

After World War II, major growth occurred in suburban areas, and San Francisco itself densified as its population expanded. Military installations, primarily located strategically along the city's Pacific frontage, contributed to the area's economic base. Economic diversification included the growth of high-technology (computers), manufacturing, service and business offices, and tourism. Major residential growth occurred throughout the city, in tandem with the regional development boom of new economic/employment centers throughout the Bay Area. Cultural resources associated with this area are likely to be associated with modern engineering and architectural trends. In general, sites and structures are not considered eligible for historic designation unless they are at least 45 years old and meet specific local, state, or national criteria.

Prehistoric and Historic Findings

Concentrations of prehistoric and historic archaeological resources are often found in large urban areas such as San Francisco that have been prehistoric centers of habitation due to climate and natural resources, as well as experiencing growth and development during the historic period. Prehistoric remains associated with Native American sites in San Francisco may include hunting apparatuses, as well as household instruments, shell and bone debris. Historic archeological remains may include stone or adobe foundations or walls, structures and remains with square nails, and refuse deposits often in old wells and privies.

This study does not attempt to evaluate the significance of any of the cultural resource materials recorded within or related to the proposed Expenditure Plan's projects. Table 3.5-1 lists San Francisco's recorded prehistoric resources.

Table 3.5-1 Prehistoric and Historic Resources in San Francisco

Source of Record	*Number of sites in San Francisco*
Recorded Prehistoric and Historic Archaeological [a]	126
Cultural Resources listed individually on the National Register of Historic Places and the California Register of Historic Places [b]	171 BSO 5 AS
California Historic Landmarks[c]	48 BSO
Listings on the California Inventory of Historical Resources	141 BSO 26 AS
Bridges Listed on the Caltrans Local Bridge Survey[d]	49

[a] Northwest Information Center, 2001. (n.1)

[b] State Office of Historic Preservation, 1998

[c] State Office of Historic Preservation, 1996

[d] Caltrans Local Bridge Survey, 1989

Abbreviations: BSO (Building, Site or Object), AS (Archaeological Site)

Historic and Conservation Districts

Historic Districts

In addition to individual historic resources, historic districts in the City and County of San Francisco have been acknowledged. A historic district is roughly defined as a collection of resources (buildings, objects, structures, landscapes) that are historically, architecturally and/or culturally significant. In the past thirty-five years, the City and County of San Francisco has designated eleven historic districts. These districts encompass nationally significant public areas such as the Civic Center and the Presidio National Park as well as residential areas such as Telegraph Hill, Alamo Square and Webster Street (see Table 3.5-2).

The historic districts in San Francisco are largely identified in terms of their common period of significance. Period of significance refers to the span of time during which significant events and activities occurred within the historic district.

Establishing a historic district is the responsibility of the Landmarks Preservation Advisory Board, which advises the San Francisco Planning Commission. After a historic or conservation district is established and classified in terms of its contribution to the city, it is protected by necessity of a Certificate of Appropriateness review for any exterior alteration under consideration, at which time the Landmarks Board may approve or reject the application. Demolition permits in a historic district may be held from approval by the Planning Commission or Board of Supervisors if there is momentum to explore feasible and prudent alternatives to demolition.

Table 3.5-2 San Francisco Historic Districts

District Name	*Location*	*Effective Date*
Alamo Square	Area generally bound by Golden Gate Avenue to the north, Divisadero Street to the west, Webster Street to the east and Fell Street to the South.	07/06/84
Blackstone Court	Area generally bound by Lombard Street to the north, Franklin Street to the east, Gough Street to the west and Greenwich Street to the south.	11/19/87
Bust Street- Cottage Row	Area generally bound by Bush Street to the north, Webster Street to the east, Fillmore Street to the west and Sutter Street to the south.	10/03/91
Civic Center	Area generally bound by Van Ness Avenue to the west, Market Street to the south, Golden Gate Avenue to the north, and Seventh Street to the east.	01/15/96
Dogpatch	Area generally bound by Mariposa Street to the north, Tubbs Street to the south, 3rd Street to the east, and Indiana Street to the west.	2003
Jackson Square	Area generally bound by Broadway to the north, Sansome Street to the east, Washington Street to the south and Columbus Avenue to the west.	08/09/72
Liberty Hill	Area generally bound by Twentieth Street to the north, Mission Street to the east, Dolores Street to the west and Twenty-Second Street to the south.	10/25/85
Northeast Waterfront	Area generally bound by Greenwich Street to the north, the Embarcadero to the east, Montgomery Street to the west and Broadway to the south.	04/08/83
South End	Area generally bound by Stillman Street to the north, First Street to the east, Ritch Street to the west and King Street to the south.	03/23/90
Telegraph Hill	Area generally bound by Greenwich Street to the north, Sansome Street to the east, Montgomery Street to the west and Green Street to the south.	11/13/86
Webster Street	Area generally bound by Jackson Street to the north, Buchanan Street to the east, Fillmore Street to the west and Clay Street to the south.	04/08/81

Source: San Francisco Preservation Bulletin No. 10 "Historic and Conservation Districts in San Francisco", San Francisco Planning Department, January 2003

Conservation Districts

Separate from the city's historic districts, San Francisco has six designated conservation districts. Like the city's historic districts, its conservation districts are categorized in terms of their common period of historical significance. In San Francisco, conservation districts can be defined as protected downtown districts that contain concentrations of buildings that together create geographic areas of unique quality (architecturally, environmentally) and are located exclusively in the city's downtown core area. Considered as a unit, these districts are seen as a positive contribution to the character of the downtown (See Table 3.5-3).

Table 3.5-3 San Francisco Conservation Areas

District Name	*Location*
Commercial-Leidesdorff Conservation District	Area generally bound by Market Street to the north, Tehama Street to the south, Anthony Street to the east and Annie Street to the west.
Front-California Conservation District	Area generally bound by Clay Street to the north, Sacramento Street to the south, Sansome Street to the east and Montgomery Street to the west.
Kearny-Belden Conservation District	Area generally bound by Pine Street to the north, Bush Street to the south, Montgomery Street to the east and Kearny Street to the west.
Kearny-Market- Mason Conservation District	Area generally bound by Sacramento Street to the north, California Street to the south, Battery Street to the east and Front Street to the west.
New Montgomery-Second Street Conservation District	Area generally bound by Pine Street to the north, Bush Street to the south, Montgomery Street to the east and Kearny Street to the west.
Pine-Sansome Conservation District	Street to the north, Bush Street to the south, Sansome Street to the east and Montgomery Street to the west.

Source: San Francisco Preservation Bulletin No. 10 "Historic and Conservation Districts in San Francisco", San Francisco Planning Department, January 2003

Policy and Regulation

When prehistoric or historic sites are identified, detailed field-level evaluation is required to determine the significance of the contents of any remains. Archival research is needed in the case of identified but unprotected archaeological sites and buildings, sites, or objects to determine the role played by the location and the contents in relation to the local history of the area, or their associations with important persons and events of local importance. Numerous recorded prehistoric and historic sites in San Francisco have not yet received this level of detailed analysis. A detailed evaluation must be conducted before mitigation measures can be finalized for those resources that will be damaged by actual construction.

Several state laws, most notably Section 15064.5 (f) of CEQA and Section 5020-5029 and 21083.2 of the Public Resources Code, protect archaeological and historic resources. CEQA requires assessment of the impacts of development projects upon unique archaeological resources or Native American culturally significant sites. If the project is found to cause damage to the resource, reasonable efforts may be required to preserve the resources, or leave then in an undisturbed state, or undertake additional mitigation measures if avoidance is not possible.

To protect historic resources, the State has formed the State Historical Resources Committee that conducts the State Historic Resource Inventory and maintains the California Register of Historic Resources, which identifies historical landmarks and points of interest. The Committee also provides recommendations for the Nation Register of Historic Resources.

3.5.2 IMPACTS AND MITIGATION MEASURES

Criteria of Significance

This EIR uses the following criteria to assess whether the proposed Expenditure Plan will have a significant adverse effect on cultural resources. An impact is considered significant if it results in one or more of the following:

- **Criterion 1:** Substantially changes the significance of a historical resource.
- **Criterion 2:** Substantially changes the significance of an archaeological resource.
- **Criterion 3:** Destroys a unique paleontological resource, site, or unique feature.
- **Criterion 4:** Disturbs human remains, including those interred outside of formal cemeteries.

Criteria for Evaluating the Significance of Historic Resources

Generally under CEQA, a resource is considered "historically significant" if it meets the requirement for listing on the California Register of Historical Resources, which involves the following:

1. It is associated with events that have made a significant contribution to the broad patterns of local or regional history, or the cultural heritage of California or the United States.

2. It is associated with the lives of persons important to local, California, or national history.

3. It embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of a master or possesses high artistic values; or

4. It has yielded, or has the potential to yield, information important to the prehistory or history of the local area, California, or this document.

In addition to determining the significance and eligibility of any identified historical resource under CEQA and the California Register, historic properties must be evaluated under the criteria for the National Register of Historic Places should federal funding or permitting become involved in any undertaking subject to this document.

Methodology and Assumptions

Because this EIR is a Program EIR, site-specific analysis of potential impacts on cultural resources is not appropriate. Instead, this analysis identifies the type and magnitude of impacts that may result from the proposed Expenditure Plan as a whole. Specific construction projects will require supplemental environmental analysis prior to construction to comply with CEQA requirements. Important cultural resources may be encountered during ground-disturbing construction work on any project included in the proposed Expenditure Plan. Projects associated with the operation and maintenance of the transportation system, such as signalization, equipment replacement and pavement maintenance, would not directly affect cultural resources.

Impacts and Mitigation Measures

Impact 3.5-a: Construction of new transportation projects supported by the Expenditure Plan has the potential to adversely affect known archaeological and historical resources in San Francisco. (Significant, mitigable)

The construction of new transportation projects within San Francisco could occur in areas where cultural resources have been identified and listed on the city's inventory of Historic Districts or Conservation areas. Damages associated with heavy construction equipment, noise and dust may pose a significant impact.

New development associated with transportation projects may also produce additional traffic (noise and air quality degradation), an increase in impervious surfaces (additional stormwater runoff), and increased pollutant levels in water runoff (from parking lots, roads, and landscaping). These types of impacts could all potentially affect identified historic and cultural resources. For example, changes in drainage patterns resulting from a new transportation structure could change the ground water table and potentially damage the foundation of a historic structure. Traffic and related noise and air quality impacts could potentially affect the character of the site.

Mitigation Measures

C-1: Project Sponsors shall demonstrate compliance with CEQA and the Public Resource Code by:

- Undertaking, prior to individual transportation improvement project approval, a records review to determine the potential for, or existence of, cultural resources.
- For development adjacent to sites with identified historic or archaeological resource, minimize degradation to the resource by studying the potential effects of: constructing the transportation projects and implementing appropriate measures to protect the cultural resources or site.

Significance After Mitigation

With the above mitigation measures, the impact to cultural resources would be reduced to a level that is not significant.

Impact 3.5-b: New development has the potential to disturb unidentified cultural resources that may have historic significance to a community or ethnic of social group. (Significant, mitigable)

Portions of areas planned for construction in the Expenditure Plan have a high potential for containing unidentified historic and archaeological resources; as they are discovered, these resources would be protected by State law. Nearly all of San Francisco's downtown area, and adjacent neighborhoods within the original city grid, contain properties of archaeological and historical sensitivity.

Mitigation Measures

C-3: In addition to Measure C-2 (above), the following measures would reduce the impact to a level that is not significant. In areas of historic and archaeological sensitivity, require project sponsors to:

- Undertake pre-construction surveys and monitoring during any ground disturbance for all transportation projects.
- If evidence of a cultural resource is found during construction, implement the following actions:
  - Cessation of construction activities
  - Evaluation by a professional archaeologist or historian to evaluate the value of the resources found and to advise on a plan to preserve resources determined to be of significance.

Significance After Mitigation

With the above mitigation measures, the above impact to cultural resources would be reduced to a level that is not significant.

3.6 ENERGY

This section discusses the energy impacts of implementing transportation improvements in the proposed New Expenditure Plan. The section identifies transportation energy laws, plans, and policies; identifies energy sources and utilities; and describes existing energy consumption and trends in San Francisco. Because of concerns with increasing concentrations of greenhouse gases in the atmosphere, such as carbon dioxide, this section evaluates trends in these emissions as well.

3.6.1 SETTING

Energy Types and Sources

Petroleum products supply approximately 39 percent of the energy demand in the U.S. (Energy Information Administration, 1999). Coal and natural gas each supply approximately 23 percent of the national energy demand, and nuclear and renewable sources supply the rest in roughly equal proportions.

Petroleum and natural gas supply most of the energy consumed in California. Petroleum products provide approximately 50 percent of the state's energy demand, and natural gas provides approximately 29 percent (California Energy Commission (CEC), 2002). The remaining 21 percent of the state's energy demand is met by a variety of energy resources, including coal, nuclear, geothermal, wind, solar, and hydropower.

Petroleum

Most gasoline and diesel fuel sold in California for motor vehicles is refined in California to meet state-specific formulations required by the California Environmental Protection Agency's Air Resources Board. Major petroleum refineries in California are concentrated in three counties: Contra Costa County in northern California, Kern County in central California, and Los Angeles County in southern California. Valero, Tesoro, Phillips, Shell and Chevron operate refineries in Contra Costa County.

In 2001, refineries in California processed approximately 655 million barrels of crude oil.[1] Approximately one-half of the crude oil came from in-state oil production facilities; approximately one-fifth came from Alaska; and the remainder (approximately 30 percent) came from foreign sources. Together the five Contra Costa refineries have a crude oil processing capacity of 737,400 barrels per day. The long-term oil supply outlook for California indicates that in-state and Alaska supplies are declining, leading to increasing dependence on foreign oil sources.

---

[1] California Energy Commission, http://www.energy.ca.gov/oil/index.html

Natural Gas

Four regions supply California with natural gas. Three of them—the Southwestern U.S., the Rocky Mountains, and Canada—supply 85 percent of all the natural gas consumed in California (CEC, 1999). The remainder is produced in California. In 2000, approximately one-third of all the natural gas consumed in California was used to generate electricity. Residential consumption represented one-fifth of California natural gas use with the balance consumed by the industrial, resource extraction, and commercial sectors.

PG&E is the primary electricity and natural gas provider for San Francisco County. PG&E obtains its energy supplies from power plants and natural gas fields in northern California and from energy purchased outside its service area and delivered through high voltage transmission lines.

Electricity

Beginning March 31, 1998, many of California's electricity consumers were allowed to make choices when they purchased their electricity. The decades-old structure of area-specific monopolies for electricity was changed under what is called "restructuring" or deregulation. Begun by the CPUC in 1992, the course electricity deregulation took was directed by legislation, mainly Assembly Bill 1890 and Senate Bill 90. Deregulation was intended to result in unbundling of generation, transmission, distribution and customer services that had previously been integrated into individual privately-owned utilities; increasing competition in the power generation business and increasing customer choice through the Power Exchange (PX); and releasing of control by privately-owned utilities of their transmission lines to a central operator called the Independent System Operator (ISO). However, due to flaws in the deregulation process, consumers in California experienced price hikes and power shortages between 2000 and 2001, thus defeating the purpose of deregulation. Post deregulation PG&E still remains the primary natural gas and electricity supplier to northern California.

Power plants in California meet approximately 85 percent of the in-state electricity demand; hydroelectric power from the Pacific Northwest provides another 2 percent and power plants in the southwestern U.S. provide another 13 percent.[2] The contribution between in-state and out-of-state power plants depends upon, among other factors, the precipitation that occurred in the previous year and the corresponding amount of hydroelectric power that is available. In the Bay Area, Contra Costa County is home to one of the largest power plants in California: the Pittsburg Power Plant. It is the fourth largest power plant in California and consumes natural gas. Smaller power plants and cogeneration facilities are located throughout the Bay Area. There are two power plants located within San Francisco: the Potrero Power Plant and PG&E's Hunters Point Power Plant. Local electricity distribution service to customers within San Francisco is provided primarily by PG&E.

---

[2] California Energy Commission, http://www.energy.ca.gov/html/energysources.html

Alternative Fuels

The U.S. Department of Transportation currently recognizes the following as alternative fuels: methanol and denatured ethanol (alcohol mixtures that contain no less than 70 percent of the alcohol fuel), natural gas (compressed or liquefied), liquefied petroleum gas, hydrogen, coal-derived liquid fuels, fuels derived from biological materials (i.e., biomass), and electricity. The liquid fuel referred to as Methanol (M85) consists of methanol and gasoline and is derived from natural gas, coal, or woody biomass. The liquid fuel referred to as Ethanol (E85) consists of ethanol and gasoline and is derived from corn, grains or agricultural waste. Natural gas consists of a high percentage of methane (generally above 85 percent), and varying amounts of ethane, propane, butane, and inerts (typically nitrogen, carbon dioxide, and helium) and comes from underground reserves. Liquefied petroleum gas (LPG) consists mostly of propane and is a byproduct of petroleum refining or natural gas processing. Current technologies for electric vehicles include lead acid and nickel metal hydride batteries.

Energy Consumption

Current annual energy consumption in the United States is approximately 97,000,000 billion British thermal units (BTU)[3], which represents approximately one-quarter of the world's energy consumption.

Current annual energy consumption in California (for all purposes, including transportation) is approximately 7,700,000 billion BTU, which represents approximately 8 percent of the nation's total energy consumption. California consumes more energy than any other state in the U.S., except for Texas (Energy Information Administration, 1999). With a relatively mild Mediterranean climate and strict energy efficiency and conservation requirements, California has lower per capita energy consumption rates than other parts of the country. According to the Department of Energy (DOE), per capita energy use in California is approximately 70 percent of the national average. California has the lowest annual electrical consumption rates per person of any state and `uses 20 percent less natural gas per person. Per capita transportation energy use in the state is near the national average (DOE, 2000). Nevertheless, with a population of 34 million people, the state is the tenth largest consumer of energy in the world.

The transportation sector currently consumes relatively minor amounts of natural gas or electricity; however, air quality laws and regulations are likely to result in increased use of compressed natural gas and electricity in the future. The CEC predicts that potential annual statewide consumption of natural gas for transportation purposes could increase from approximately 33 million therms in 2000 to a range of 80 to 90 million therms over the next 15 to 20 years (Energy Information Administration, 1999). Electricity consumption for transportation purposes could potentially increase from 494 million kWh in 2000 to a range of 670 to 746 million kWh over that same period.

---

[3] The units of energy used in this report are British thermal units (BTU), kilowatt-hours (kWh), therms, and gallons. A BTU is the quantity of heat required to raise the temperature of 1 pound of water 1 degree Fahrenheit at sea level. Since the other units of energy can all be converted into equivalent British thermal units, the BTU is used as the basis for comparing energy consumption associated with different resources. A kWh is a unit of electrical energy, and one kWh is equivalent to approximately 10,200 BTU, taking into account initial conversion losses (i.e., from one type of energy, such as chemical, to another type of energy, such as mechanical) and transmission losses. Natural gas consumption typically is described in terms of cubic feet or therms; 1 cubic foot of natural gas is equivalent to approximately 1,050 BTU, and 1 therm represents 100,000 BTU. One gallon of gasoline/diesel is equivalent to approximately 140,000 BTU, taking into account energy consumed in the refining process.

Table 3.6-1 provides estimated 2000 transportation energy consumption in California and compares statewide totals with the corresponding values for the nine-county Bay Area. As shown in Table 3.6-1, motor vehicles account for the bulk of total transportation energy consumption in the Bay Area. Electricity consumption for Bay Area transportation purposes is substantial, at 416 million kWh per year or 80 percent of the statewide transportation demand. The cost and availability of electricity have become critical issues in California and could affect the operating costs of those transit systems dependent on electricity for propulsion (BART, light rail, and potentially Caltrain in the future). Natural gas consumption is approximately 5 million therms per year, which is relatively minor.

Table 3.6-1: Transportation Energy Consumption in California and the Bay Area (2000)

Annual Consumption in Energy Resource Units			
Fuel Type	*Units*	*State*	*Bay Area*
Gasoline / Diesel	million gallons	14,378	3,159
Electricity	million kWh	505	416
Natural Gas	million therms	34	5

Source: California Department of Transportation, California Motor Vehicle Stock, Travel and Fuel Forecast, November 2000;CEC, On-Road & Rail Transportation, Energy Demand Forecasts for California, April 1999; Environmental Science Associates, 2001.

Transportation activities consume more than one-fifth of San Francisco's total energy. Personal auto use accounts for more than half of total transportation energy use locally, and more than half of this total is for work commuting. On the PG&E system, the installed hydroelectric and renewable capacity is larger than in the rest of the state, and approximately 51 percent of the electrical generating sources delivering power to the PG&E grid use fossil. PG&E delivered 5,748 million kilowatt (kW) hours to customers in San Francisco County in 2000. Approximately 74 percent of this power was sold to commercial and industrial accounts. The average residential account in San Francisco used 4,743 kWhr a year, about 33 percent less than the state average for residential energy electricity consumption.

PG&E supplied its customers in northern California with approximately 900 billion standard cubic feet (scf) of natural gas in 2002 (CEC, 2002). Industrial and commercial customers accounted for approximately two thirds of this gas. San Francisco County is located in a coastal climate zone (Climate Zone 3 in the Title 24 Climate Zone designation mapping) and, with the moderating influence of the bay, requires less energy for heating than other parts of the state.

Over 150 million gallons of gasoline were consumed in San Francisco in 2000. Per capita gasoline consumption in San Francisco County in 2000 was approximately 199 gallons annually, approximately half of the state average.

Energy use in transportation is related to the following factors: the efficiency of cars, trucks, and public transportation, choice of different travel modes (auto, carpool, and public transit), and miles traveled by these modes. Energy is also consumed with ongoing and routine operation and maintenance of the transportation infrastructure.

Energy Efficiency by Transportation Mode

Long-term energy consumption trends for transportation will be largely determined by fuel efficiency trends for motor vehicles, since motor vehicles are the predominant transportation mode for passengers and commercial goods.

Model year 2000 cars had the lowest recorded fuel economy ratings since 1980, largely due to buyer preferences for sport utility vehicles (21 percent of new car sales in the U.S.). Since 1981, improved engine performance has largely been offset by an increase in the average weight of cars and light duty trucks (10 percent and 16 percent, respectively).

Based on recent trends, this EIR assumes that the energy efficiency of cars will not advance significantly, essentially a reasonable worst-case assumption (although there are certainly technologies available that could make large strides toward greater efficiency, such as the hybrid models). The overall energy efficiency estimated for the entire vehicle fleet today is 22 mpg, remaining constant for the forecast period.

Energy Used By Public Transit

Public Transit energy consumption includes energy consumed for operation of public buses, ferries, and electrified rail systems. Using statistics developed by the American Public Transit Association, the generalized energy factors for different types of transit service are provided in Table 3.6-2 below.

Table 3.6-2: Energy Factors of Transit Service

Service	*Energy Factor (BTU/Vehicle Mile)*
Diesel Bus[a]	19,858
Electric Light Rail	92,727
Diesel Commuter Rail	466,667
Electric Commuter Rail	102,000
Diesel Ferry	32,634

[a] As noted in section 3.3, Transportation Authority Resolution No. 03-30 establishes as policy that the Authority will no longer fund procurement of diesel buses; however, for purposes of this analysis, MUNI motor coaches are conservatively assumed to remain diesel powered in the future.

Source: American Public Transit Association, 2003.

Energy used by Commercial Vehicles

Commercial vehicles, which are generally composed of light, medium, and heavy trucks generally fueled by diesel or gasoline, are part of the general fleet mix of vehicles present within the Bay Area transportation system. Based on data for the State of California from the CEC, generalized energy factors for these types of vehicles are provided on Table 3.6-3 below:

Table 3.6-3: Energy Factors for Commercial Vehicles

Service	*Energy Factor (BTU/Vehicle Mile)*
Light-Duty Vehicles	6,091 (6,291)[a]
Medium- and Heavy-Trucks	26,260 (24,950)[a]

[a] Based on projections for Year 2001 with values in parentheses shown for Year 2020.

Source: CEC, 2000.

Global Warming

Since the beginning of the industrial revolution, atmospheric concentrations of carbon dioxide have increased nearly 30 percent, methane concentrations have more than doubled, and nitrous oxide concentrations have risen by about 15 percent. These increases contribute to the trapping of heat in the earth's atmosphere. (Water vapor in the atmosphere is also a significant source of heat trapping, and is as or more potent than carbon dioxide.) Sulfate aerosols, a common air pollutant, cool the atmosphere by reflecting light back into space; however, sulfates are short-lived in the atmosphere and vary regionally.

There is currently strong consensus among scientists that the combustion of fossil fuels and other human activities are the primary reason for the increased concentration of atmospheric carbon dioxide. Fossil fuels burned to run cars and trucks, heat homes and businesses, and provide power to factories are responsible for about 98 percent of U.S. carbon dioxide emissions, 24 percent of methane emissions, and 18 percent of nitrous oxide emissions. Increased agriculture, deforestation, landfills, industrial production, and mining also contribute a significant share of emissions.

Similar to the energy trends above, global warming emissions from carbon dioxide emitted from transportation sources will be strongly linked to the fuel efficiency of the automobile engine. The consumption of fossil fuels in transportation produces about 20 pounds of carbon dioxide for each pound of fuel consumed. In addition the generation of electricity for rail systems produces carbon dioxide, unless the source is hydro, solar, or thermal. A certain amount of electrical energy is also wasted in the transmission of the power from the generating plant to the end user.

Regulatory Setting

Federal and state agencies regulate energy consumption through various policies, standards, and programs. At the local level, individual cities and counties regulate energy through their regulatory and planning activities. On the federal level, the U.S. Department of Transportation, U.S. Department of Energy, and U.S. Environmental Protection Agency (EPA) are three agencies with substantial influence over energy policies and programs. Generally, federal agencies influence transportation energy consumption through establishment and enforcement of fuel economy standards for automobiles and light trucks, through funding of energy-related research and development projects, and through funding for transportation infrastructure projects.

On the state level, the California Public Utilities Commission and CEC are two agencies with authority over different aspects of energy. The California Public Utilities Commission regulates privately-owned utilities in the energy, rail, telecommunications, and water fields. The CEC collects and analyzes energy-related data, prepares state-wide energy policy recommendations and plans, promotes and funds energy efficiency programs, and regulates the power plant siting process. California is preempted under federal law from setting state fuel economy standards for new on-road motor vehicles.

At the local level, the City and County of San Francisco, through its regulatory and planning activities, directly influences how, and to what extent, energy is used in the city. Local regulations governing the design, construction and use of buildings affect operational energy needs. Transportation policy decisions directly affect petroleum- based fuel requirements. Some of the more relevant federal and state transportation-energy-related laws and plans are discussed below. The relevant energy goals and policies in the San Francisco General Plan are also discussed.

Federal Regulations

Energy Policy and Conservation Act

The Energy Policy and Conservation Act of 1975 sought to ensure that all vehicles sold in the U.S. would meet certain fuel economy goals. Through this Act, Congress established the first fuel economy standards for on-road motor vehicles in the U.S. Pursuant to the Act, the National Highway Traffic and Safety Administration, which is part of the U.S. Department of Transportation, is responsible for establishing additional vehicle standards and for revising existing standards. Since 1990, the fuel economy standard for new passenger cars has been 27.5 miles per gallon. Since 1996, the fuel economy standard for new light trucks (gross vehicle weight of 8,500 pounds or less) has been 20.7 miles per gallon. Heavy-duty vehicles (i.e., vehicles and trucks over 8,500 pounds gross vehicle weight) are not currently subject to fuel economy standards.

Compliance with federal fuel economy standards is not determined for each individual vehicle model, but rather, compliance is determined on the basis of each manufacturer's average fuel economy for the portion of their vehicles produced for sale in the U.S. The Corporate Average Fuel Economy (CAFE) program, which is administered by the U.S. EPA , was created to determine vehicle manufacturers' compliance with the fuel economy standards. U.S. EPA calculates a CAFE value for each manufacturer based on city and highway fuel economy test results and vehicle sales. Based on the information generated under the CAFE program, the U.S. Department of Transportation is authorized to assess penalties for noncompliance.

Intermodal Surface Transportation Efficiency Act

The Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) promoted the development of intermodal transportation systems to maximize mobility as well as address national and local interests in air quality and energy. ISTEA contained factors that Metropolitan Planning Organizations (MPOs), such as MTC, were to address in developing transportation plans and programs, including some energy-related factors. To meet the new ISTEA requirements, MPOs adopted explicit policies defining the social, economic, energy, and environmental values that were to guide transportation decisions in that metropolitan area. The planning process was then to address these policies. Another requirement was to consider the consistency of transportation planning with federal, state, and local energy goals. Through this requirement, energy consumption was expected to become a decision criterion, along with cost and other values that determine the best transportation solution.

Transportation Equity Act for the 21st Century

The Transportation Equity Act for the 21st Century (TEA-21) was signed into law in 1998 and builds upon the initiatives established in the ISTEA legislation, discussed above. TEA-21 authorizes highway, highway safety, transit, and other surface transportation programs for the next six years. TEA-21 continues the program structure established for highways and transit under ISTEA, such as flexibility in the use of funds, emphasis on measures to improve the environment, and focus on a strong planning process as the foundation of good transportation decisions. TEA-21 also provides for investment in research and its application to maximize the performance of the transportation system through, for example, deployment of Intelligent Transportation Systems, to help improve operations and management of transportation systems and vehicle safety.

Clean Cities Program

The U.S. Department of Energy's Clean Cities Program promotes voluntary, locally based government/industry partnerships for the purpose of expanding the use of alternatives to gasoline and diesel fuel by accelerating the deployment of alternative fuel vehicles (AFVs) and building a local AFV refueling infrastructure (DOE, 1999). The Clean Cities Program has created more than 70 partnerships in communities throughout the country including San Francisco.

State Regulations

State of California Energy Plan

The CEC is responsible for preparing the State Energy Plan, which identifies emerging trends related to energy supply, demand, conservation, public health and safety, and the maintenance of a healthy economy. The current plan is the 1997 California Energy Plan (CEC, 1997). The plan calls for the state to assist in the transformation of the transportation system to improve air quality, reduce congestion, and increase the efficient use of fuel supplies with the least environmental and energy costs. To further this policy, the plan identifies a number of strategies, including assistance to public agencies and fleet operators in implementing incentive programs for zero-emission vehicles and addressing their infrastructure needs; and encouragement of urban designs that reduce vehicle miles traveled and accommodate pedestrian and bicycle access.

California Environmental Quality Act (CEQA)

Appendix F of the CEQA Guidelines describes the types of information and analyses related to energy conservation that are to be included in Environmental Impact Reports (EIRs) . In Appendix F of the CEQA Guidelines, energy conservation is described in terms of decreased per capita energy consumption, decreased reliance on natural gas and oil, and increased reliance on renewable energy sources. To assure that energy implications are considered in project decisions, EIRs must include a discussion of the potentially significant energy impacts of proposed projects, with particular emphasis on avoiding or reducing inefficient, wasteful, and unnecessary consumption of energy.

Local Regulations

San Francisco General Plan

The Energy section of the Environmental Protection Element of the General Plan provides the City and County of San Francisco with a comprehensive and pragmatic energy management program that can promote a productive collaboration between municipal government and local residents. This document guides both public and private decisions affecting the use of energy. San Francisco's Energy Policy was designed with four goals in mind: (l) increasing the efficiency with which energy is used locally; (2) diversifying the present balance of resource supplies to meet local energy needs; (3) fostering the economic development of energy management services and renewable energy systems; and (4) encouraging the active participation of members of the community to carry out this program. Seven objectives are set forth to achieve these goals. The first four objectives address energy management opportunities in the government, residential, commercial, and transportation sectors. The fifth objective encourages renewable resource use. The remaining two objectives focus on the complex and interrelated roles of municipal government, PG&E, and State and Federal governments in energy management and financing activities. The General Plan contains several objectives and policies for the achievement of those objectives. The following objective and its related policies focus on transportation energy.

Objective 15: Increase the energy efficiency of transportation and encourage land use patterns and methods of transportation, which use less energy.

The following policies have been developed to take advantage of density and location of San Francisco to reduce the need to travel and increase access to transit. Some policies also focus on energy savings that would result from construction of mixed use development projects that integrate employment with residential and shopping uses.

The benefits of reduced transportation energy use are clear. It will save money for both San Francisco's residents and business community while conserving critical fuel resources. This will, in turn, reduce the city's vulnerability to oil supply interruptions, with the added environmental benefit of lessening pollution and congestion.

Policy 15.1	Increase the use of transportation alternatives to the automobile.
Policy 15.2	Provide incentives to increase the energy efficiency of automobile travel.
Policy 15.3	Encourage an urban design pattern that will minimize travel requirements among working, shopping, recreation, school and childcare areas.
Policy 15.4	Promote more efficient commercial freight delivery.
Policy 15.5	Encourage consideration of energy use issues when making transportation investment decisions.
Policy 15.6	Promote alternative work arrangements, which will contribute to more efficient transportation use.

3.6.2 IMPACT ANALYSIS

Criteria of Significance

An impact is considered to be significant if the proposed Expenditure Plan results in the following:

- **Criterion 1:** A five (5) percent or greater increase in energy consumption, compared to the existing conditions. Energy consumption includes the energy required for operation of the transportation system (private vehicles and public transit).

An increase in energy consumption due to projected increases in travel associated with future population and employment growth in the region is considered a cumulative energy impact (see Chapter 5 for discussion of cumulative impacts).

Method of Analysis

The energy analysis is based on the transportation modeling results from the SF-TDM analysis, which includes the projected use of different travel modes (transit, carpools, single occupant vehicles), and anticipated vehicle miles of travel (VMT).

Transit energy consumption is also based on the usage rates for the different travel modes. In this case, the rates are applied to total daily transit vehicle miles estimated by SFCTA. The analysis does not incorporate energy consumption due to fuel production, fuel transportation, and fuel transmission.

Summary of Impacts

Long-term energy consumption effects could occur from both on-road motor vehicles and public transit. For on-road vehicles, the change in energy use would be primarily due to the change in activity (VMT) since the fuel economy is assumed to remain the same through 2025. For public transit, the activity of several transit operators (including MUNI, BART, Caltrain, and ferry operators) would be affected by the implementation of the Expenditure Plan. The change in public transit energy consumption would result from increase in transit activity planned under the Expenditure Plan.

Impact 3.6-a Implementation of the Expenditure Plan projects would increase energy consumption within the county, compared to existing conditions. (Less than significant)

Implementation of the Expenditure Plan projects would affect energy consumption of on-road vehicles as well as public transit vehicles. These changes are discussed below.

Energy Used by On-road Vehicles

Table 3.6-4 outlines estimated energy usage by on-road vehicles in San Francisco for the proposed Expenditure Plan, compared to year 2000 values and to the No Project Alternative values. The estimates do not include public transit vehicles. Average on-road vehicle fuel economy rates in California are approximately 22 miles per gallon in 2000 and are assumed to remain steady throughout the remainder of the planning period to 2025 (horizon year for transportation modeling – all substantive Expenditure Plan physical projects will be completed by this date).

Table 3.6-4 Daily Energy Use by Private Vehicles

	VMT	*Gallons*	*Billion BTU*
2000	9,342,184	424,645	59.45
2025 Baseline (No Project Alternative)	10,638,052	483,548	67.7
2025 Proposed Expenditure Plan	10,556,001	479,818	67.17

Source: VMT from SFCTA, 2003.

As shown in Table 3.6-4, the energy consumption from on-road vehicle travel within San Francisco increases by 7.72 billion BTU per day in 2025 with the Expenditure Plan implemented, when compared to existing conditions. However, the Expenditure Plan represents a decrease in consumption, relative to the future baseline (No Project) scenario because overall private vehicle VMT will substantially decrease (compared to the No Project scenario) as a result of the Expenditure Plan's improvements to transit services.

Energy used by Public Transit

Table 3.6-5 summarizes daily energy use by Transit Agencies that serve San Francisco County. Some changes in future engine technologies were assumed; these have a substantial impact on estimated energy use by public transit in future scenarios. The analysis assumes the following (consistent with the assumptions used in the air quality analysis in Section 3.3):

- MUNI's existing fleet of diesel-fueled motor coaches is conservatively assumed to continue to be diesel-fueled in 2025, while all of MUNI's other transit vehicles would be electric. Although the Transportation Authority has established policy that MUNI may no longer procure diesel buses in the future, and all MUNI vehicles are required to be zero emission vehicles in 2025 by state law, the technology MUNI would adopt to reduce emissions to meet this standard is not clear. Also, there is no feasible technology currently available. Hence to avoid speculation, it has been conservatively assumed that diesel fueled motor coaches would continue to use diesel in 2025.
- Several routes currently served by diesel fueled MUNI motor coaches (such as the 3rd Street route and BRT routes) will be converted to electric transit, representing a reduction in the VMT for motor coaches and an increase in the VMT for trolley coaches and light rail.
- Fuel technologies for other regional transit operators such as Golden Gate Transit, BART, AC Transit, SamTrans, and ferries are assumed to remain the same through 2025.[4] Projects proposed under the Expenditure Plan would not affect energy use from Golden Gate Transit, AC Transit, and SamTrans in 2025. Energy consumption of these transit operators would change from existing conditions due to other transportation improvements included in the MTC's RTP.
- Electrification of Caltrain would occur as planned.

Table 3.6-5 Daily Energy Use by Transit, Billion BTU/day

	Muni[b]	*BART*	*Caltrain*[c]	*GG*[a]	*AC Transit*[a]	*SamTrans*[a]	*Ferry*[a]	*TOTAL*
2000	3.32	3.11	1.73	.58	.22	.61	.05	9.62
2025 Baseline (No Project Alternative)	3.67	4.56	.54	.75	.25	.26	.05	10.08
2025 Expenditure Plan	3.97	4.56	.59	.75	.25	.26	.07	10.45

[a] San Francisco serving routes only, all portions.
[b] MUNI vehicle mix for 2000 based on MUNI Short Range Transit Plan http://www.sfmuni.com/abm_rpts/srtf025.htm.
[c] Caltrain presumed diesel in 2000 and electric in 2025.

Source: VMT by Agency from SFCTA. Transit Fuel Economy factors from APTA, "Major Power Source Efficiency, Miles per Gallon" http://www.apta.com/research/stats/energy/powereff.cfm May, 2003.

---

[4] Assumptions about increased ferry activity were consistent with those used in the Water Transit Authority Ferry Transit Expansion Plan.

Table 3.6-6 outlines the total energy used for transportation systems in San Francisco in 2000, expected energy use in 2025 without the Expenditure Plan (No Project), and 2025 energy use with the Expenditure Plan. As shown in the table, the long term net operational energy impact—calculated as the difference between the 2025 Expenditure Plan and 2025 Baseline (No Project) scenarios of implementation of the Expenditure Plan alone—would be a reduction of approximately 0.16 billion BTU per day. This reduction is due to the anticipated decrease in private vehicle use and the increase in transit use; the increase in transit use and associated energy requirements would be more than offset by the reduction in energy use from the decrease in private vehicle use. This reduction in energy use is less than one percent of the 2025 Baseline energy use.

Table 3.6-6 Daily Energy Use by Transportation Systems (BTUs in billions)

	Long-Term Operational Energy Requirements		*Total*
	Vehicle Use	*Transit Use*	
2000	59.45	9.62	69.07
2025 Baseline	67.70	10.08	77.78
2025 Expenditure Plan	67.17	10.45	77.62
Expenditure Plan Alone	-0.53	0.37	-0.16

Source: Environmental Science Associates, 2003.

Significance

This impact, while beneficial, is less than significant.

Mitigation Measure

No mitigation measures are necessary, as the impact is not significant.

3.7 GEOLOGY AND SEISMICITY

This section discusses geology, soils, and seismicity issues associated with the City and County of San Francisco and the transportation projects identified in the proposed Expenditure Plan. Topography, underlying geologic materials, and surficial soils within the city are described in this section, as are landsliding, settlement, and soil-related issues such as erosion. Additionally, earthquake related hazards including ground shaking, liquefaction, earthquake-induced landsliding, and tsunamis are assessed in combination with a discussion of regional Bay Area faults.

3.7.1 SETTING

Regional Geology

The City and County of San Francisco is located on the northern tip of the San Francisco Peninsula, within the Coast Ranges geologic province. The Coast Ranges is a northwest trending series of mountain ranges and valleys. The general geologic setting of the city is characterized by bedrock hills bounded by broad valleys underlain by unconsolidated deposits. The bedrock consists of consolidated rocks of the Franciscan Complex and the Great Valley Sequence of late Jurassic and Cretaceous age (Schlocker, 1974). The Franciscan Complex generally consists of graywacke (sandstone), shale, chert, greenstone, and melange; in certain places, serpentine, an asbestos-containing rock-type, is found within the shale matrix. The Great Valley Sequence generally consists of sandstone and shale. Bedrock outcrops in hilly areas account for approximately 24 percent of the land surface in San Francisco. The unconsolidated sediments comprise the seven groundwater basins within San Francisco (Philips et al., 1974).

On the west side of San Francisco, unconsolidated sediments consist of the following units described from the oldest (deepest) to the youngest (most shallow):

- The Merced Formation, consisting of Pliocene-age (5.3 to 1.6 million years ago) shallow marine and estuarine deposits with thin interbedded muds and peats, some thicker beds are known to exist. Tilted fine grained strata within this unit may impede horizontal groundwater flow.
- The Colma Formation, consisting of Pleistocene-age (1.6 million to 10,000 years ago) fine-grained sand, silty sand, and occasional beds of clay as much as five feet thick. These materials were probably eroded from the Merced Formation and redeposited. The Colma Formation crops out in areas near Lake Merced.
- Dune sands, consisting of Pleistocene age well-sorted fine to medium sand. Prevailing westerly winds have swept the sand from Ocean Beach and Bakers Beach to locations throughout the city. This unit underlies more than half of San Francisco and can be up to 150 feet thick.

On the north and east sides of San Francisco, the unconsolidated sediments consist of the Colma Formation and dune sand (described above), as well as the following units:

- Older bay mud deposits, generally consisting of firm, dark greenish gray, silty clay with varying amounts of sand and fine gravel. Deposits of older bay mud are restricted to the bay side of the peninsula.
- Younger bay mud (Bay Mud) is a natural estuarine deposit present throughout most of the Bay that consists of generally uniform gray, soft, saturated clay and silt with organic material and some sand, deposited in areas of weak tidal currents and low water turbulence, primarily consisting of soft, gray silty clay. Deposits of Bay Mud are primarily encountered on the bay side of the peninsula. This unit reaches a maximum thickness of approximately 140 feet in San Francisco.
- Artificial fill generally consisting of hydraulically placed dredge sands that may contain clay, rock waste from excavations, man-made debris, and organic wastes. This unit reaches a maximum thickness of about 60 feet in San Francisco. Artificial fill is largely concentrated in the Bay margin areas on the northern and eastern side of the city. During the mid 1800's to early 1900's, artificial fill was used to fill in tidal flats and estuarine marshes to create building pads for residential and commercial development.
- Other relatively fine grained surficial deposits such as alluvium, which is soil material transported and deposited by running water. Alluvium generally consists of clayey silty sand and clayey silt with some pebbles.

Local Soils

Soils in the city are comprised of silty clays, clays and loams having many similar characteristics; the upland soils tend to be shallower and richer in clay (Helley and Lajoie, 1979). Typical soil properties are characterized by moderate to high shrink-swell potential, poor to ponded runoff (drainage), moderate corrosivity, low to moderate permeability and moderate load-bearing strengths. Fill material is variable in soil properties.

Seismicity

The San Francisco Bay Area region contains both active and potentially active faults and is considered a region of high seismic activity (see Figure 3.7-1).[1] The 1997 Uniform Building Code locates the entire Bay Area within Seismic Risk Zone 4. Areas within Zone 4 are expected to experience maximum magnitudes and damage in the event of an earthquake (Lindeburg, 1998). The U.S. Geological Survey (USGS) Working Group on California Earthquake Probabilities has evaluated the probability of one or more earthquakes of Richter magnitude 6.7 or higher occurring in the San Francisco Bay Area within the next 30 years. The result of the evaluation indicated a 62 percent likelihood that such an earthquake event will occur in the Bay Area between 2002 and 2032 (USGS, 2003).

---

[1] An "active" fault is defined by the State of California as a fault that has had surface displacement within Holocene time (approximately the last 10,000 years). A "potentially active" fault is defined as a fault that has shown evidence of surface displacement during the Quaternary (last 1.6 million years), unless direct geologic evidence demonstrates inactivity for all of the Holocene or longer. This definition does not, of course, mean that faults lacking evidence of surface displacement are necessarily inactive. "Sufficiently active" is also used to describe a fault if there is some evidence that Holocene displacement occurred on one or more of its segments or branches (Hart, 1997).

While the magnitude is a measure of the energy released in an earthquake, intensity is a measure of the ground shaking effects at a particular location. The estimated (moment) magnitudes shown in Table 3.7-1 represent characteristic earthquakes on particular faults.[2] Ground movement during an earthquake can vary depending on the overall magnitude, distance to the fault, focus of earthquake energy, and type of geologic material. The composition of underlying soils, even those relatively distant from faults, can intensify ground shaking. The Modified Mercalli (MM) intensity scale (Table 3.7-2) is commonly used to measure earthquake effects due to ground shaking. The MM values for intensity range from I (earthquake not felt) to XII (damage nearly total), and intensities ranging from IV to X could cause moderate to significant structural damage.[3] In San Francisco, maximum ground shaking intensity resulting from an earthquake generated on the active San Andreas fault, discussed below, is anticipated to range between strong (MM VII) to violent (MM IX), depending upon specific location. A small southwest portion of the city could experience very violent (MM X) ground shaking intensities (ABAG, 2003a).

---

[2] Moment magnitude is related to the physical size of a fault rupture and movement across a fault. The Richter magnitude scale reflects the maximum amplitude of a particular type of seismic wave. Moment magnitude provides a physically meaningful measure of the size of a faulting event (CGS, 1997a). The concept of "characteristic" earthquake means that we can anticipate, with reasonable certainty, the actual earthquake that can occur on a fault.

[3] The damage level represents the estimated overall level of damage that will occur for various MM intensity levels. The damage, however, will not be uniform. Some buildings will experience substantially more damage than this overall level, and others will experience substantially less damage. Not all buildings perform identically in an earthquake. The age, material, type, method of construction, size, and shape of a building all affect its performance (ABAG, 1998).

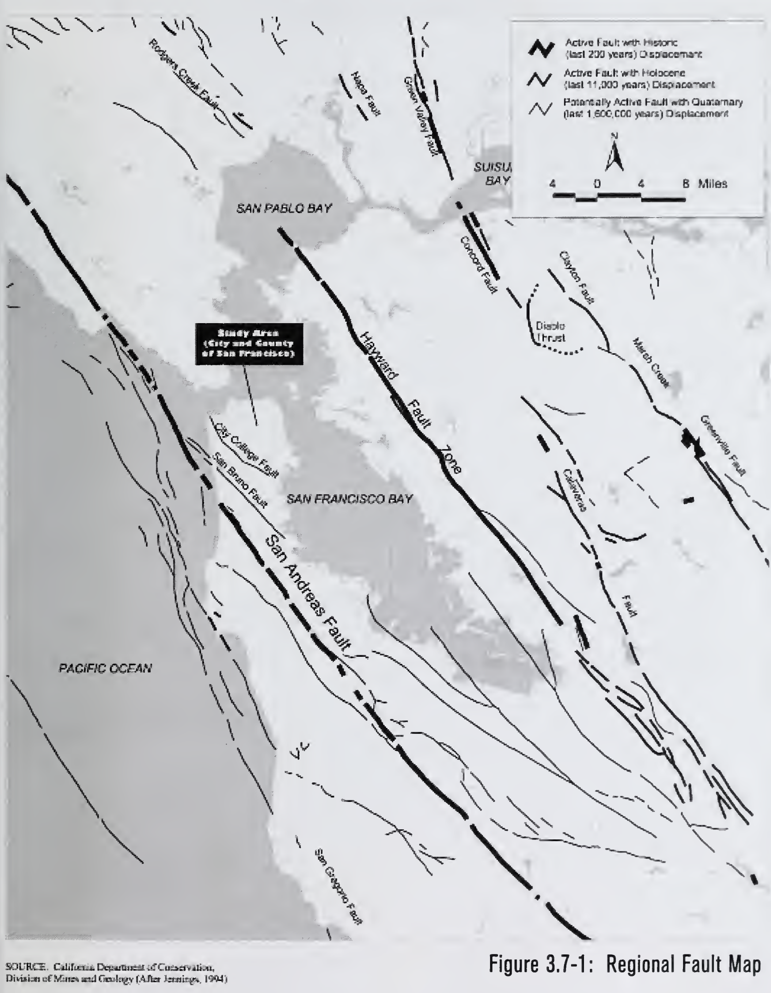


Figure 3.7-1: Regional Fault Map

SOURCE. California Department of Conservation, Division of Mines and Geology (After Jennings, 1994)

Table 3.7-1 Active Faults in the Vicinity of the City of San Francisco

Fault	*Distance and Direction from San Francisco County*[a]	*Recency of Movement*	*Fault Classification*[b]	*Historical Seismicity*[c]	*Maximum Moment Magnitude Earthquake (Mw)*[d]
San Andreas	<1 mile west	Historic (1906; 1989 ruptures) Holocene	Active	M7.1, 1989 M8.25, 1906 M7.0, 1838 Many <M6	7.9
Hayward	10 miles east	Historic (1836; 1868 ruptures) Holocene	Active	M6.8, 1868 Many <M4.5	7.1
San Gregorio-Hosgri	12 miles southwest	Holocene - Late Quaternary	Active	Many M3-6.4	7.3
Rodgers Creek	25 miles northeast	Historic Holocene	Active	M6.7, 1898 M5.6, 5.7, 1969	7.0
Calaveras	25 miles east	Historic (1861 rupture) Holocene	Active	M5.6–M6.4, 1861 M4–M4.5 swarms 1970, 1990	6.8
Concord–Green Valley	25 miles east	Historic (1955) Holocene	Active	Historic active creep	6.9

[a] Fault distance is referenced from the fault's closest point to the County of San Francisco (excluding Treasure Island). Actual fault distance from specific project locations may therefore vary from than those listed.

[b] Refer to footnote 1.

[c] Richter magnitude (M) and year for recent and/or large events. The Richter magnitude scale reflects the maximum amplitude of a particular type of seismic wave.

[d] Moment magnitude is related to the physical size of a fault rupture and movement across a fault. Moment magnitude provides a physically meaningful measure of the size of a faulting event (CGS, 1997a). The Maximum Moment Magnitude Earthquake (Mw), derived from the joint CGS/USGS Probabilistic Seismic Hazard Assessment for the State of California, 1996. (CGS OFR 96-08 and USGS OFR 96-706).

Sources: Hart, 1997; Jennings, 1994; Peterson, 1996.

Table 3.7-2 Modified Mercalli Intensity Scale

Intensity Value	*Intensity Description*	*Average Peak Acceleration*
I	Not felt except by a very few persons under especially favorable circumstances.	< 0.0017 ga
II	Felt only by a few persons at rest, especially on upper floors on buildings. Delicately suspended objects may swing.	< 0.014 g
III	Felt noticeably indoors, especially on upper floors of buildings, but many people do not recognize it as an earthquake. Standing motor cars may rock slightly, vibration similar to a passing truck.	< 0.014 g
IV	During the day felt indoors by many, outdoors by few. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably.	0.014–0.039 g
V	Felt by nearly everyone, many awakened. Some dishes and windows broken; a few instances of cracked plaster; unstable objects overturned. Disturbances of trees, poles may be noticed. Pendulum clocks may stop.	0.039–0.092 g
VI	Felt by all, many frightened and run outdoors. Some heavy furniture moved; and fallen plaster or damaged chimneys. Damage slight.	0.092–0.18 g
VII	Everybody runs outdoors. Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable in poorly built or badly designed structures; some chimneys broken. Noticed by persons driving motor cars.	0.18–0.34 g
VIII	Damage slight in specially designed structures; considerable in ordinary substantial buildings, with partial collapse; great in poorly built structures. Panel walls thrown out of frame structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned. Sand and mud ejected in small amounts. Changes in well water. Persons driving motor cars disturbed.	0.34–0.65 g
IX	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb; great in substantial buildings, with partial collapse. Buildings shifted off foundations. Ground cracked conspicuously. Underground pipes broken.	0.65–1.24 g
X	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations; ground badly cracked. Rails bent. Landslides considerable from riverbanks and steep slopes. Shifted sand and mud. Water splashed (slopped) over banks.	> 1.24 g
XI	Few, if any, (masonry) structures remain standing. Bridges destroyed. Broad fissures in ground. Underground pipelines completely out of service. Earth slumps and land slips in soft ground. Rails bent greatly.	> 1.24 g
XII	Damage total. Practically all works of construction are damaged greatly or destroyed. Waves seen on ground surface. Lines of sight and level are distorted. Objects are thrown upward into the air.	> 1.24 g

[a] g (gravity) = 980 centimeters per second squared. 1.0 g of acceleration is a rate of increase in speed equivalent to a car traveling 328 feet from rest in 4.5 seconds.

Sources: Bolt, 1988 and CGS, 2003.

Regional Faults

The San Andreas and the Hayward faults are the two principally active, strike-slip-type faults[4] in the Bay Area and have experienced movement within the last 150 years. Other principal faults capable of producing significant ground shaking are listed in Table 3.7-1 and include the San Gregorio-Hosgri, Rodgers Creek, and the Concord-Green Valley faults, as shown on Figure 3.7-1. A major seismic event on any of these active faults could cause significant ground shaking within the project region, as was experienced during earthquakes in recent history, namely the 1906 San Francisco earthquake, and the 1989 Loma Prieta earthquake.

The San Andreas Fault Zone is a major structural feature in the region and forms a boundary between the North American and Pacific tectonic plates, extending from the Salton Sea in Southern California near the border with Mexico to north of Point Arena, where the fault trace extends out into the Pacific Ocean. The main trace of the San Andreas Fault through the Bay Area trends northwest through the Santa Cruz Mountains and the eastern side of the San Francisco Peninsula. Near San Francisco, the San Andreas fault trace is located immediately off-shore near Daly City and continues northwest through the Pacific Ocean approximately 6 miles due west of the Golden Gate Bridge.

The San Andreas Fault Zone was the source of two major seismic events in recent history that resulted in widespread damage through the San Francisco region, the 1906 San Francisco earthquake (M 7.9), and the more recent 1989 Loma Prieta earthquake (M 7.1). The USGS Working Group on California Earthquake Probabilities estimated there is a 21 percent chance of the San Andreas fault experiencing an earthquake of M 6.7 or greater in the next 30 years (USGS, 2003).

Potentially Active Faults

There are two potentially active northwest-trending faults within San Francisco, the San Bruno and City College faults (Jennings, 1994). The San Bruno Fault parallels the San Bruno Mountains and passes through Lake Merced in a northwesterly direction, a similar trend as the San Andreas Fault. It is classified as an Early Quaternary fault, indicating the last known movement occurred between 700,000 to 1.6 million years ago (Jennings, 1994). The City College Shear Zone is a pre-Quaternary fault (> 1.6 million years ago) trends northwest to southeast, extending from Lincoln Park southeastward to San Francisco Bay near the Bayshore. Much of this shear zone has no surface expression and is projected beneath dune sands and alluvial sediments. The fault zone appears to affect only bedrock.

---

[4] "Strike-slip" faults primarily exhibit displacement in a horizontal direction, but may have a vertical component. Right-lateral strike-slip movement of the San Andreas fault, for example, means that the western portion of the fault is slowly moving north while relative motion of the eastern side is to the south.

Seismic Hazards

Surface Fault Rupture

Seismically induced ground rupture is defined as the physical displacement of surface deposits in response to an earthquake's seismic waves. The magnitude, sense, and nature of fault rupture can vary for different faults or even along different strands of the same fault. Surface rupture can damage or collapse buildings, cause severe damage to roads and pavement structures, and cause failure of overhead as well as underground utilities. As a result of the damage, buildings could become uninhabitable, roads closed, and utility service disrupted for an undeterminable length of time. Future faulting is generally expected along different strands of the same fault (CGS, 1997b). Ground rupture is considered more likely along active faults, which are referenced above.

The City of San Francisco is not located within an Alquist-Priolo Fault Rupture Hazard Zone (discussed below), as designated through the Alquist-Priolo Earthquake Fault Zoning Act, and no mapped active faults are known to pass through the city. Although several potentially active faults are present, these faults are not known to have experienced movement within the last 10,000 years, and are not designated as Alquist-Priolo Fault Rupture Hazard Zones. There is therefore is a low potential that fault rupture would occur within the project area.

Ground Shaking

Ground shaking from a major earthquake could affect San Francisco, potentially resulting in substantial damage to the transportation system. Earthquakes on the active faults (listed in Table 3.7-1) are expected to produce a range of ground shaking intensities at the project site. Ground shaking may affect areas hundreds of miles distant from the earthquake's epicenter. The epicenter of the Loma Prieta earthquake was approximately 60 miles southwest of San Francisco yet caused serious damage to elevated freeway structures in San Francisco, and resulted in the collapse of a panel on the upper deck of the Bay Bridge. Ground shaking intensities experienced during Loma Prieta are less than the maximum ground shaking intensity which San Francisco could experience during an earthquake on the San Andreas fault (ABAG, 2003b) The composition of underlying materials in areas located relatively distant from faults can intensify and prolong ground shaking. Areas that are underlain by bedrock tend to experience less ground shaking than those underlain by unconsolidated sediments such as fill. The soft, saturated mud and unengineered fill present near along the San Francisco Bay shoreline is classified by the Association of Bay Area Governments (ABAG) as an area of "Extremely High" shaking amplification, the highest of eight classes of amplification (ABAG, 2003c).

According to the California Geological Society (CGS, formerly known as California Division of Mines and Geology) probabilistic seismic hazard map, peak ground acceleration in San Francisco could reach 0.5-0.7 g, and in the southwestern portion of the city may exceed 0.7 g (Peterson, et al., 1999). A probabilistic seismic hazard map depicts the severity of ground shaking from earthquakes that geologists and seismologists agree could occur, but has a 90 percent chance of not exceeding in 50 years (an annual probability occurrence of 1 in 475). It is "probabilistic" in the sense that the analysis takes into consideration the uncertainties in the size and location of earthquakes and the resulting ground motions that can affect a particular site, and expresses the probability of exceeding a certain ground motion.[5]

Liquefaction

Liquefaction is a phenomenon that occurs when water-saturated, loose to medium dense, relatively clay-free sands and silts are subjected to earthquake ground motion. The tendency of these soils to compact due to ground vibrations exerts an increased water pressure on the soils, forcing the grains apart, and generating a "quick" or liquefied condition leading to loss of foundation-bearing strength and as a result, structural damage. Areas susceptible to liquefaction tend to be underlain by thick unconsolidated deposits, particularly soft, saturated muds and fill near the shore of the San Francisco Bay. The widespread destruction of property in the Marina District of San Francisco in the 1989 Loma Prieta quake was caused by the liquefaction of hydraulically placed fill material (Seed et al., 1990). Soil liquefaction causes ground failure that can damage roads, pipelines, underground cables, and buildings with shallow foundations. Liquefaction more commonly occurs in looser, saturated materials. Areas in the city that are susceptible to liquefaction include filled areas along the Bay front and former Bay inlets, and in sandy low lying areas along the ocean front and around Lake Merced (City and County of San Francisco, 1996). Figure 3.7-2 depicts areas within the city and County of San Francisco classified by the CGS as liquefaction Seismic Hazard Zones (CGS, 2001).

Lurching or lateral spreading is a type of ground failure associated with liquefaction that involves predominantly horizontal displacement of liquefied materials toward relatively unsupported free faces, such as a creek bed or ocean front without a seawall. Minor lurching occurred in the Marina District of the city during the Loma Prieta earthquake, but was minimized by the seawall.

Earthquake-induced Landslides

The susceptibility of land (slope) failure is dependent on the slope and geology as well as the amount of rainfall, excavation, or seismic activities. A landslide is a mass of rock, soil, and debris displaced down-slope by sliding, flowing or falling. In San Francisco, a major earthquake could cause movement of active slides and could trigger new slides in the same general areas of previous slides. The steep hills of San Francisco underlain by Franciscan rocks are generally most susceptible to landsliding. The deposits of the Merced and Colma formations, which consist of unconsolidated sand, silt and clay, have fair to good stability under seismic conditions (URS Consultants, 1974). Similarly, sand dune deposits, with their relatively clean, well-sorted sand, are relatively stable unless the groundwater table is close to the surface or the material is otherwise saturated; in which case they have a high potential for liquefaction and consequent failure during an earthquake. The CGS has designated areas within San Francisco as earthquake-induced landsliding Seismic Hazard Zones, as depicted on Figure 3.7-2.

---

[5] The CGS probabilistic seismic map for 10 percent probability of exceedance in 50 years represents ground motions that geologists and seismologists do not think will be exceeded in the next 50 years. This probability level of ground shaking is used for formulating building codes and designing buildings in highly active seismic areas, allowing engineers to design buildings for larger ground motions that geologists and seismologists think will occur during a 50-year interval, which makes buildings safer than if there were only designed for the ground motions that are expected to occur. Seismic shaking maps are prepared using consensus information on historical earthquakes and faults (Peterson et al., 1999).

Earthquake-induced Settlement

Settlement of the ground surface can be accelerated and accentuated by earthquakes. During an earthquake, settlement can occur as a result of the relatively rapid compaction and settling of subsurface materials (particularly loose, non-compacted, and variable sandy sediments) due to the rearrangement of soil particles during prolonged ground shaking. Settlement can occur both uniformly and differentially (i.e. where adjoining areas settle at different rates). Areas are susceptible to differential settlement if underlain by compressible sediments, such as poorly engineered artificial fill or Bay Mud present along the San Francisco Bay shoreline.

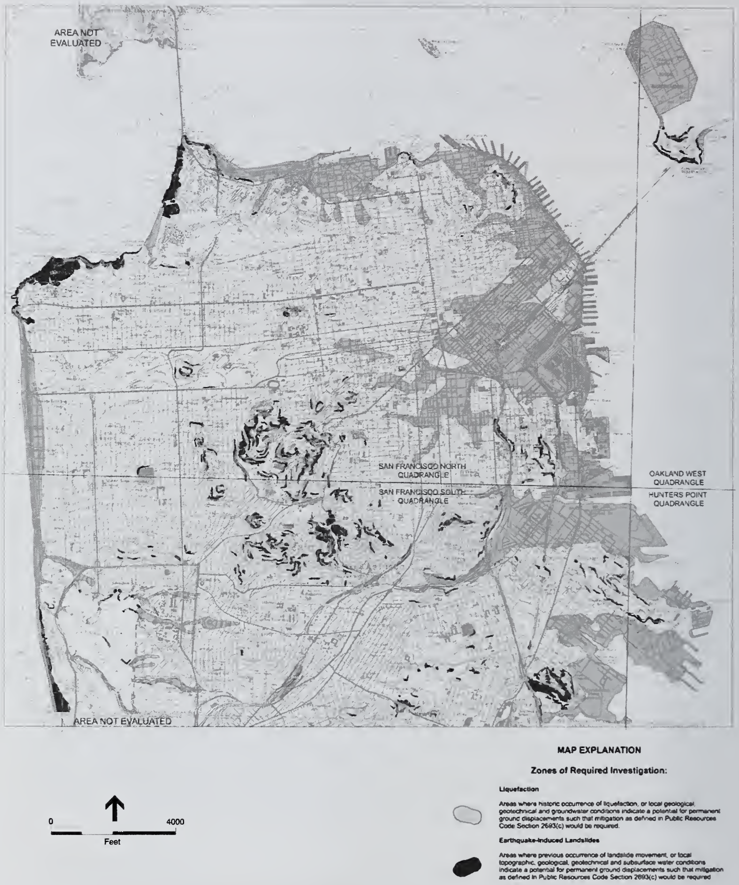
Tsunami

Tsunamis (seismic sea waves) are long period waves that are caused by underwater seismic disturbances, volcanic eruptions, or submerged landslides. Tsunamis affecting the city would most likely originate west of the Bay, within the Pacific Rim. During a period between 1854 and 1964, approximately 21 tsunamis were recorded at the Fort Point tide gauge in San Francisco. The largest wave height recorded was 7.4 feet resulting from the 1964 Alaska earthquake. It is estimated that a tsunami with a wave height or run up to 20 feet could pass through the Golden Gate every 200 years. A ten-foot wave is estimated to occur every 90 years. A tsunami of this height would most likely produce little inundation damage except for beaches and former bay margins that have been artificially filled. Activities in these areas may be disrupted due to inundation or damage caused by the tsunami. Figure 3.7-3 depicts potential inundation zones associated with a 20-foot tsunami.

Geologic Hazards

Landslide Hazards

As earlier discussed, the susceptibility of land (slope) failure is dependent on the slope and geology as well as the amount of rainfall, excavation or seismic activities. Areas within the city that are generally susceptible to landsliding due to steep slopes and underlying geologic materials are depicted in Figure 3.7-4. Heavy periods of rainfall or destabilization of slopes by human undercutting of the hillside base or “toe” could exacerbate landslide hazards in these areas.



MAP EXPLANATION

Zones of Required Investigation:

Liquefaction

◯ Areas where historic occurrence of liquefaction, or local geological, geotechnical and groundwater conditions indicate a potential for permanent ground displacements such that mitigation as defined in Public Resources Code Section 2693(c) would be required.

Earthquake-Induced Landslides

● Areas where previous occurrence of landslide movement, or local topographic, geological, geotechnical and subsurface water conditions indicate a potential for permanent ground displacements such that mitigation as defined in Public Resources Code Section 2693(c) would be required

SOURCE: California Geological Survey, 2001

Figure 3.7-2 : Liquefaction & Earthquake Induced Landslide Seismic Hazard Zones

Differential Settlement

If not properly engineered, loose, soft soils comprised of sand, silt, and clay have the potential to settle after a building or other load is placed on the surface. Differential settlement of the loose soils generally occurs slowly, but over time can amount to more than most structures can tolerate. The weak and compressible nature of Bay Mud and the unpredictable performance of artificial fill provide poor support for structures and infrastructure. Differential settlement can damage buildings and their foundations, roads and rail lines, and result in breakage of underground pipes.

Soil Erosion

Erosion is the wearing away of soil and rock by processes such as mechanical or chemical weathering, mass wasting, and the action of waves, wind, and underground water. Soils containing high amounts of silt or clay can be easily erodable while sandy soils are less susceptible. Excessive soil erosion can eventually lead to damage of building foundations and roadways. In the city, areas that are susceptible to erosion include those underlain by Bay Mud and other fine-grained materials, such as along the San Francisco Bay shoreline.

Expansive/Corrosive Soils

Expansive soils possess a "shrink-swell" behavior. Shrink-swell is the cyclic change in volume (expansion and contraction) that occurs in fine-grained clay sediments from the process of wetting and drying. Structural damage may occur over a long period of time, usually the result of inadequate soil and foundation engineering or the placement of structures directly on expansive soils. Soils with high clay content, such as the Bay Muds located in the eastern portion of San Francisco, are highly expansive. Depending on their acidity and alkalinity, some soils in the city can be highly corrosive which could result in damage to buried concrete, steel pipes, and electrical conduits.

Regulatory Setting

Alquist-Priolo Earthquake Fault Zoning Act

The Alquist-Priolo Earthquake Fault Zoning Act (formerly the Alquist-Priolo Special Studies Zones Act), signed into law in December 1972, requires the delineation of zones along active faults in California. The purpose of the Alquist-Priolo Act is to regulate development on or near fault traces to reduce the hazard of fault rupture and to prohibit the location of most structures for human occupancy across these traces. Cities and counties must regulate certain development projects within the zones, which includes withholding permits until geologic investigations demonstrate that development sites are not threatened by future surface displacement (Hart, 1997). Surface fault rupture is not necessarily restricted to the area within a Fault Rupture Hazard Zone, as designated under the Alquist-Priolo Act. The project area is not located within such a zone.

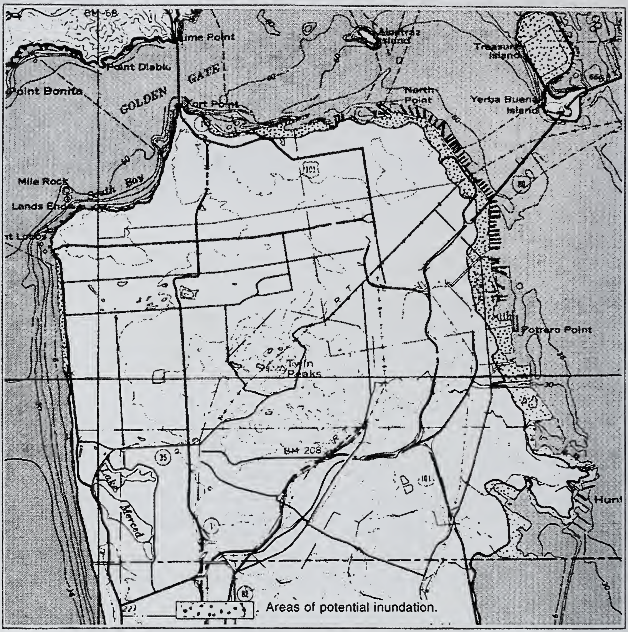


Figure 3.7-3: 20-Foot Tsunami Run-Up Map

SOURCE: Maps showing areas of potential inundation by tsunamis in the San Francisco Bay Region, United States Geological Survey, 1972.

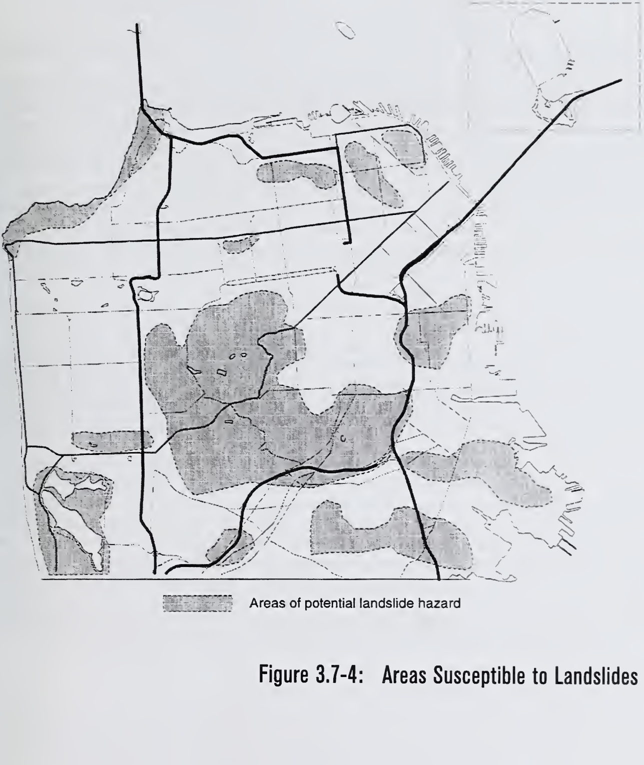


Figure 3.7-4: Areas Susceptible to Landslides

SOURCE: URS/John Blume and Associates, 1974.
Treasure Island, Treadwell and Rollo, 1995.

Seismic Hazards Mapping Act

The Seismic Hazards Mapping Act was developed to protect the public from the effects of strong ground shaking, liquefaction, landslides, or other ground failure, and from other hazards caused by earthquakes. This act requires the State Geologist to delineate various seismic hazard zones and requires cities, counties, and other local permitting agencies to regulate certain development projects within these zones. Before a development permit is granted for a site within a seismic hazard zone, a geotechnical investigation of the site must be conducted and appropriate mitigation measures incorporated into the project design. Geotechnical investigations conducted within Seismic Hazard Zones must incorporate standards specified by CGS Special Publication 117, Guidelines for Evaluating and Mitigating Seismic Hazards (CGS, 1997c). The CGS has completed seismic hazard mapping for portions of California most susceptible to liquefaction and earthquake-induced landsliding, including the City and County of San Francisco.

California Building Standards Code

The California Building Standards Code is another name for the body of regulations known as the California Code of Regulations (CCR), Title 24. CCR Title 24 is assigned to the California Building Standards Commission, which, by law, is responsible for coordinating all building standards. Under state law, all building standards must be centralized in CCR Title 24 or they are not enforceable (Bolt, 1988).

Published by the International Conference of Building Officials, the Uniform Building Code (UBC) is a widely adopted model building code in the United States. The California Building Code incorporates by reference the UBC with necessary California amendments. About one-third of the text within the California Building Code is tailored for California earthquake conditions (ICBO, 1997). The project area is located within Zone 4, which, of the four seismic zones designated in the United States, is expected to experience the greatest effects from earthquake ground shaking and therefore has the most stringent requirements for seismic design. Notwithstanding, the national model code standards adopted into Title 24 apply to all occupancies in California except for modifications adopted by state agencies and local governing bodies.

California Department of Transportation

Jurisdiction of the California Department of Transportation (Caltrans) includes state and interstate routes within California. Any work within the right-of-way of a federal or state transportation corridor is subject to Caltrans regulations governing allowable actions and modifications to the right-of-way. Caltrans standards incorporate the UBC and California Building Code, and contain numerous rules and regulations to protect the public from seismic hazards such as surface fault rupture, and ground shaking. In addition, Caltrans standards require that projects are constructed to minimize potential hazards associated with cut and fill operations, grading, slope instability, and expansive or corrosive soils, as described in the Caltrans Highway Design Manual (HDM).

Community Safety Element

A revised version of the Community Safety Element of the San Francisco General Plan was adopted by the Planning Commission on April 27, 1997, and approved by the Board of Supervisors on August 11, 1997. The updated Element continues current policies that require new structures built in areas where site conditions could pose hazards, such as liquefaction or landslide, to be constructed in ways that reduce those hazards. Policy 2-1 is to "assure that new construction meets current structural and life safety standards." Policy 2-3 is to "consider site soils conditions when reviewing projects in areas subject to liquefaction or slope instability." Policy 2-9 is to "consider information about geologic hazards whenever City decisions that will influence land use, building density, building configuration or infrastructure are made." (City and County of San Francisco, 1997)

To implement the life safety policies of the Community Safety Element, as well as the Seismic Hazard Mapping Act, engineers and inspectors at the Department of Building Inspection (DBI) should work closely with a geotechnical team to ensure that all life safety issues are addressed by special site investigations and that appropriate recommendations are included in a geotechnical report, if needed. The recommendations are incorporated in the permit requirements for proposed construction. Each proposed construction site is evaluated individually, based on its actual surface and subsurface conditions.

3.7.2 IMPACT ANALYSIS AND MITIGATION MEASURES

Criteria of Significance

This EIR uses the following geology and seismicity criteria to assess whether proposed improvements in the SFCTA Expenditure Plan would have a potential significant adverse effect. If one or more of these criteria are met, a significant adverse impact is identified.

- **Criterion 1:** Expose people or structures to potential damaging geologic forces. Increased exposure of people to the risk of property loss, injury, or death involving:
  - Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault
  - Strong seismic ground shaking
  - Seismic-related ground failure, including liquefaction
  - Landslides
- **Criterion 2:** Substantial soil erosion or topsoil loss.
- **Criterion 3:** Located on expansive soils (high shrink-swell potential), as defined in Table 18-1-B of the Uniform Building Code, or on weak, unconsolidated soils creating substantial risks to life or property.

Method of Analysis

Impacts are determined for the proposed Expenditure Plan as a whole and for specific projects involving new construction. Transportation project locations have been compared to general geology and shaking maps from various sources. These maps provide broad information on areas of estimated ground shaking response, liquefaction potential, and fault location. Due to the scale of these maps, this analysis should be used in the most general sense, and does not satisfy the eventual need for site-specific surveys for individual projects.

Summary of Impacts

The proposed Expenditure Plan includes a wide range of project types including the building of new facilities throughout the city, retrofitting existing facilities and stations, and retrofitting, upgrading, installing and replacing tracks, signs, and other equipment throughout the city.

The entire Bay Area, including the City of San Francisco, is susceptible to impacts associated with seismic events on one of the several active or potentially active faults in the region. These faults could potentially generate seismic ground shaking capable of damaging existing and proposed transportation facilities. As such, new and existing transportation projects would be exposed to both the direct and indirect effects of earthquakes. Potential effects from severe ground shaking and liquefaction could cause catastrophic damage to transportation infrastructure, particularly elevated structures. Seismic exposure during construction would be considered short-term, while long-term impacts would be expected to continue throughout the life of the project or facility. The impact analysis in this section addresses both short-term and long-term geologic hazards.

Significant Impacts and Mitigation Measures

Impact 3.7-a: Seismic events could damage existing and proposed transportation infrastructure and pose public safety risks through ground shaking, liquefaction, earthquake-induced landslides, differential settlement and tsunamis. (Significant, mitigable)

Surface Fault Rupture

The Alquist-Priolo Earthquake Fault Zoning Act (see further discussion under Regulatory Background section, above) requires the zonation of active faults in California. The purpose of the Alquist-Priolo Act is to regulate development on or near active fault traces to reduce the hazard of fault rupture. It is important to note, however, that surface fault rupture is not necessarily restricted to the area within the Alquist-Priolo Zone. The Alquist-Priolo Earthquake Fault Zoning Act (formerly the Alquist-Priolo Special Studies Zone Act) also requires the delineation of zones along active faults in California. There are no active fault zones mapped within the City and County of San Francisco therefore, no projects are located within Alquist-Priolo Earthquake Hazard Zones.

Ground Shaking

Proposed transportation improvements susceptible to intense seismic ground shaking are generally those areas in close proximity to the causative faults, and those areas underlain by thick, unconsolidated deposits, particularly soft, saturated Bay Mud and artificial fill near the shoreline of the Bay. These soft, loosely consolidated, saturated sediments have the tendency to amplify ground shaking and cause structural damage or result in collapse of older structures, especially those that have not undergone seismic retrofitting. Table 3.7-3 summarizes proposed projects located in areas most likely to experience very strong (Modified Mercalli intensity VIII or greater).

Table 3.7-3: Projects Susceptible to Strong Ground Shaking

Area	*Project*
Bay Bridge	Seismic reinforcement and SFOBB Rehabilitation(DPW)
Treasure Island	Treasure Island Infrastructure Improvements
Ferry Terminal	Golden Gate Ferry Terminal Rehabilitation
4th and Townsend and 1st and Mission	New Transbay Terminal
4th and King Street to Chinatown	3rd Street Light Rail – 2nd Phase (Subway)
30th Street and Mission Street	New BART Station
25th and Illinois Streets	Metro East facility expansion (MUNI)
Indiana and Mann Streets	Islais Creek motor facility (MUNI)
Oakdale Avenue	Relocate Caltrain Station from Paul Ave. to Oakdale Ave.
Third Street and Bayshore Blvd.	Construction of Carroll Ave. overpass
Candlestick Interchange	Reconfiguration of the Candlestick interchange.
Great Highway	Great Highway erosion repair (DPW)
US 101 South of Golden Gate between Park Presidio and Richardson Dr.	Doyle Drive replacement
Geary Blvd. from Pacific Ocean to Transbay Terminal	Surface LRT

Liquefaction and Earthquake-Induced Landslides

The CGS has designated areas of the City and County of San Francisco as liquefaction or earthquake-induced landslide Seismic Hazard Zones, as depicted on Figure 3.7-2. Projects located in areas most likely to be susceptible to liquefaction are listed in Table 3.7-4.

Table 3.7-4: Projects Subject to Liquefaction

Project Area	*Project*
Bay Bridge	Seismic reinforcement and SFOBB Rehabilitation(DPW)
Ferry Terminal	Golden Gate Ferry Terminal Rehabilitation
4th and Townsend and 1st and Mission	New Transbay Terminal
4thand King Street to Chinatown	3rd Street Light Rail – 2nd Phase (Subway)
30th Street and Mission Street	New BART Station
25th and Illinois Streets	Metro East facility expansion (MUNI)

Table 3.7-4: Projects Subject to Liquefaction

Project Area	*Project*
Indiana and Mann Streets	Islas Creek motor facility (MUNI)
Third Street and Bayshore Blvd.	Construction of Carroll Ave. overpass
Candlestick Interchange	Reconfiguration of the Candlestick interchange.
Great Highway	Great Highway erosion repair (DPW)
US 101 South of Golden Gate between Park Presidio and Richardson Dr.	Doyle Drive replacement

Tsunamis

Tsunamis could occur along the Pacific Ocean shoreline and along the Bay shoreline resulting in temporarily high water levels and possible property damage, erosion, injury and loss of life and structural damage.

Mitigation Measures

G-1 Project sponsors shall demonstrate compliance with the provisions of CEQA and NEPA, as applicable, prior to project approval by the SFCTA. At the time of project certification, project sponsors shall agree to comply with mitigation measures to avoid and minimize impacts relating seismic and geological risks. Typical measures that may be included by project sponsors include:

- The proposed projects shall be required to comply with the UBC, California Building Code and Caltrans design standards. This may include: a site-specific geotechnical investigation shall be conducted that includes, but is not limited to, an assessment of subsurface lithology, surficial soils, a seismic evaluation of potential maximum ground motion at the site, and dynamic characteristics of the proposed structure. In addition, projects located within liquefaction or earthquake-induced landslide Seismic Hazard Zones shall be encouraged to comply with CGS Publication 117 (Guidelines for Evaluating and Mitigating Seismic Hazards).
- Potential seismic hazards associated with projects located within the tsunami inundation area depicted on Figure 3.7-4 shall be minimized through designs to diminish wave inundation and associated damage. For example, precautionary measures such as specifying final foundation or roadbed elevations greater than the expected height of a tsunami with a given return frequency would be effective.

Significance after Mitigation

Implementation of the above mitigation measure would reduce seismic hazards from new transportation facilities. Although new structures would be constructed to survive a strong earthquake without collapse, it is likely that some segments of roads and transit facilities would be damaged. Predicting seismic events is not possible, nor can site-specific, seismic-appropriate design entirely reduce the potential for injury and damage that can occur during a seismic event.

However, conformance with the mitigation measure would reduce potential impacts related to seismic ground shaking to a less than significant level.

Impact 3.7-b: Short- and long-term erosion hazards could occur. (Significant, mitigable)

Rail and track, road construction, and street improvements could require significant earthwork. Such projects could increase short-term and long-term soil erosion potential and slope failure. Soil erosion hazards could occur during preliminary stages of construction, especially during initial site grading and excavation. In addition to causing sedimentation problems in storm drain systems, rapid water erosion could remove topsoil, cause deeply incised gullies on slopes, or undermine engineered soils beneath foundations and paved surfaces. Sandy soils would be more susceptible to wind erosion than clayey soils if exposed soils are not kept wet.

Road cuts could also expose soils to erosion over the life of the project, creating potential landslide and falling rock hazards. Engineered roadways can be undercut over time by uncontrolled storm water drainage. Projects on steep grades or those requiring substantial amounts of cut and fill would pose the greatest potential for slides and erosion impacts. Engineered soils could also erode due to poor construction methods and design features or lack of maintenance.

Mitigation Measures

G-2 SFCTA shall require project proponent to conduct project-level environmental review, and where appropriate project proponents shall obtain a National Pollutant Discharge Elimination System (NPDES) General Construction Permit from the Regional Water Quality Control Board, as discussed in Water Resources Section 3.11, in order to reduce potential erosion and subsequent sedimentation of surface waters for project sites that meet or exceed one acre in size. For projects that are less than one acre in size, SFCTA shall require project proponents to employ Best Management Practices to reduce soil erosion by water and wind. These could include, but are not limited to, restricting grading to the dry season, if necessary and practical, protecting all finished graded slopes from erosion using such techniques as erosion control matting and hydro-seeding, silt fencing, or other suitable measures outlined in the Association of Bay Area Governments' (ABAG) Manual of Standards for Erosion and Sediment Control Measures or the San Francisco Bay Regional Water Quality Control Board's Erosion and Sediment Control Field Manual.

G-3 SFCTA shall require project proponents to ensure that project designs provide adequate slope drainage and appropriate landscaping to minimize potential future occurrences of slope instability and erosion.

Significance after Mitigation

Use of appropriate construction methods, earthwork design, and road cut design (as described above) would reduce this potentially significant risk of soil erosion and/or slope failure impact to a less-than-significant level.

Impact 3.7-c: ***Projects built on highly compressible, expansive, or corrosive soils could become damaged and weakened over time. (Significant, mitigable)***

Inadequate soil and foundation engineering on weak or unconsolidated soils (such as poorly engineered artificial fill) could cause soils and overlying structures to settle unevenly, thereby weakening structural facilities. Low-strength soils subjected to settlement could, over time, cause damage to underground utilities such as pipelines and tunnels. Structures placed directly on expansive soils could be subject to seasonal shrink/swell effects, causing structural damage and possibly damage to underground utilities.

If groundwater is present, the majority of the soils in San Francisco exhibit a moderate to high potential to corrode piping, supports, pilings and utility lines because of their salinity, alkalinity, or poor drainage properties. More recent, imported soils tend to have more favorable characteristics than native soils, such as better drainage. Site-specific sampling would be required to evaluate the corrosivity of the soils and if corrosive conditions are present, pipes, supports, pilings and utility lines would need to be constructed of corrosion resistant materials or other corrosion control techniques could be employed.

Mitigation Measure

G-4 SFCTA shall require project proponent to conduct project-level environmental review, and where appropriate, require that site-specific geotechnical investigations be conducted by qualified professionals (registered civil and geotechnical engineers, registered engineering geologists) to identify potential geologic hazards associated with surficial soils and subsurface sediments. Recommended corrective measures, such as structural reinforcement, soil treatment, or replacing existing soil with engineered fill shall be incorporated into project designs.

Significance after Mitigation

This mitigation measure is expected to reduce the risk of exposure to corrosive soils, and highly compressible or expansive soils to a less-than-significant level if incorporated by project sponsors.

Impact 3.7-d: ***Construction in Serpentine rock could increase exposure to public safety risks. (Significant, mitigable)***

Excavation or blasting of existing soils and rock may be required for construction at certain sites. There is a potential these activities could encounter serpentine, a commonly occurring rock in the Franciscan Complex that often contains naturally-occurring asbestos fibers (chrysotile), a known carcinogen. During excavation activities, fragmentation of serpentine rock could result in airborne asbestos fibers that, if friable, would present an inhalation hazard to workers and the community. In addition, disposal of naturally-occurring asbestos may require special procedures if the material is considered hazardous.

Mitigation Measure

G-5 SFCTA shall require project proponent to conduct project-level environmental review, and where appropriate, require project proponents to employ specific measures such as having the resident engineer or field geologist on-site to identify serpentine material; laboratory testing of serpentine material to determine if it is friable; thorough watering of all exposed cut areas during excavation in the Franciscan Complex; upwind and downwind monitoring for fibers; continuous misting of stock piles and wetting and covering haul trucks carrying serpentine rock. Disposal of any spoils containing asbestos shall be at a certified facility.

Significance after Mitigation

This mitigation measure is expected to reduce the risk of exposure to asbestos to a less-than-significant level.

3.7-e: Seismic strengthening of existing bridges, interchanges, and overpasses throughout the Bay Area. (Beneficial)

The Expenditure Plan includes seismic strengthening of several transportation facilities. In addition, all new transportation facilities, interchanges, overpasses, etc. will be designed to current seismic standards that were updated as a result of information acquired from the Loma Prieta and Northridge earthquakes. It is expected that as a result of these efforts, implementation of the Expenditure Plan will improve the survivability of the San Francisco transportation system, reduce the risk to travelers using existing retrofitted and new transportation facilities, and reduce the overall magnitude and extent of social and economic disruption in the event of a major seismic event.

3.8 HAZARDOUS MATERIALS

This section addresses the hazardous materials issues associated with the City and County of San Francisco and implementation of the proposed Expenditure Plan. This section discusses, in general, potential sources of hazardous materials associated with proposed project construction and operations, potential soil contamination, and potential hazardous materials associated with existing site structures or historic site operations.

3.8.1 SETTING

The Hazardous Materials Setting presents a brief definition of hazardous materials and waste, a description of potential sources of hazardous materials and wastes in San Francisco, and a summary of the regulatory framework. Figure 3.8-1 provides broad information on areas of potential hazardous materials contamination within the City and County of San Francisco. In general, the potential to encounter hazardous materials during construction activities is greater in the eastern portions of San Francisco and decreases toward the western portions of San Francisco.

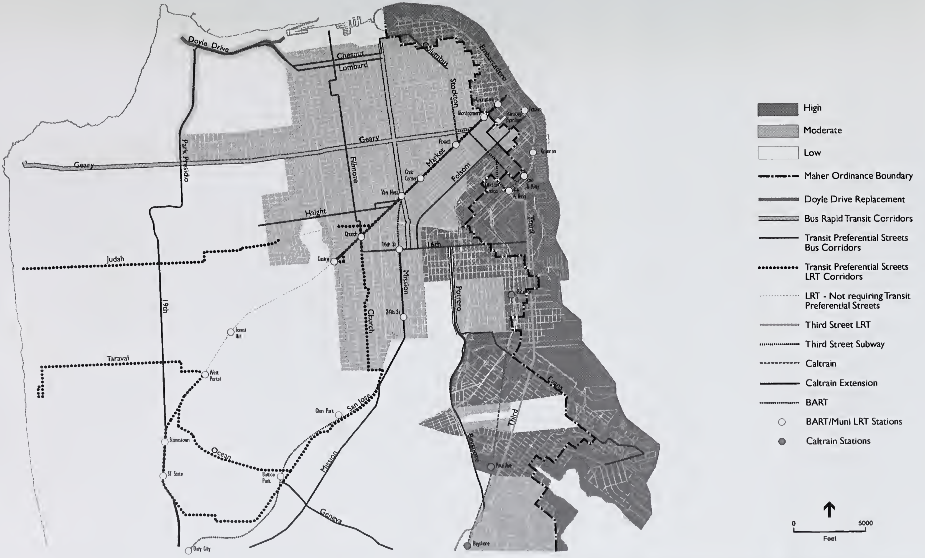
Definition of Hazardous Materials and Waste

Hazardous materials are substances with certain physical or chemical properties that could pose a substantial present or future hazard to human health or the environment when improperly handled, disposed, or otherwise managed. Title 22 of the California Code of Regulations, Division 4.5, Chapter 11, Article 3 groups hazardous materials into the following four categories based on their properties: toxic (causes human health effects), ignitable (has the ability to burn), corrosive (causes severe burns or damage to materials), and reactive (causes explosions or generates toxic gasses). Hazardous materials have been and are commonly used in commercial, agricultural, and industrial applications as well as in residential areas to a limited extent.

A hazardous *waste* is any waste that may (1) cause, or significantly contribute to an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness, or (2) pose a substantial present or potential hazard to human health or the environment, due to factors including, but not limited to, carcinogenicity, acute toxicity, chronic toxicity, bioaccumulative properties, or persistence in the environment, when improperly treated, stored, transported, or disposed of, or otherwise managed (California Health and Safety Code, Section 25141). If improperly handled, hazardous materials and wastes can result in public health hazards if released to the soil or groundwater or through airborne releases in vapors, fumes, or dust.

Sources of Hazardous Materials and Waste

Hazardous materials or hazardous waste may exist at a project site due to historic or current site activities. Land uses throughout the city may involve varying degrees of hazardous materials use, storage, or transport. Industrial sites are more likely to store and use hazardous materials in processes or maintenance. Some commercial uses, such as gas stations, dry cleaners, and film developers are also sources of hazardous materials and wastes.



SOURCE: Dyett & Bhatia; Environmental Science Associates

SF CTP Program EIR / 203039

Figure 3.8: Potential to Encounter Hazardous Materials during Construction

Soil Contamination

Sources of soil contamination may include leaking above- or below-ground petroleum storage tanks, illegally disposed drums containing hazardous or solid wastes, chemicals or other raw materials spills, or materials left on-site from previous uses.

Underground and Aboveground Storage Tanks

An underground storage tank system (UST) is a tank and any underground piping connected to the tank that has at least 10 percent of its combined volume underground. Until the mid-1980s, most UST's were made of bare steel that can corrode over time resulting in leakage. Faulty installation or maintenance procedures also can cause UST leakage, in addition to potential releases associated with spills. Similarly poor maintenance, installation, or spills associated with aboveground storage tanks (ASTs) can result in soil impacts. UST's and AST's can present health and environmental risks, including the potential for fire and explosion, the latter being more susceptible to damage caused by vehicles or vandals.

Asbestos-Containing Materials

Asbestos is a naturally occurring fibrous material used as a fireproofing and insulating agent in building construction before such uses were banned by the Environmental Protection Agency (EPA) in the 1970s. Serpentine bedrock, located in many areas through San Francisco, can contain asbestos fibers that could be released into the atmosphere during excavation, blasting, or crushing activities.

Lead and Lead-Based Paint

The presence of lead in soils above natural background levels can be a common occurrence in areas that were created by fill and in former industrial areas. Lead concentrations in fill can originate from building and industrial rubble containing or affected by sources of lead such as piping, coatings, and other construction materials. The California Code of Regulations, Title 22, considers waste soil with lead to be hazardous if it exceeds a total concentration of 1,000 parts per million (ppm) and a soluble concentration of 5 ppm. Tetraethyl lead (TEL) may also be present in project areas from historic roadside deposition of lead. Although leaded gasoline is no longer used, TEL is frequently still present in surface and shallow soils along roadways.

Polychlorinated Biphenyls

Polychlorinated biphenyls (PCBs) are synthetic organic oils that were historically used in many types of electrical equipment, including transformers and capacitors, primarily as electrical insulators. Production and use of PCBs was discontinued in 1977 following discovery that exposure to PCBs may cause various health effects.

Polycyclic Aromatic Hydrocarbons

Polycyclic aromatic hydrocarbons (PAHs) are a group of organic chemicals found in a wide variety of materials, including crude oil, asphalt, and creosote. Most refined petroleum products also contain PAHs, either retained from the original crude or produced during the refining process. PAHs are produced as combustion products and therefore occur in many burned or charred materials. Elevated concentrations of PAHs may occur in soils or offshore sediment due to the presence of historic fill and the variety of previous uses in the area.

Materials from the 1906 Earthquake

Parts of San Francisco are underlain by fill materials, such as those sections of the city that were previously part of San Francisco Bay, and may include debris from the 1906 earthquake and fire. It is likely that these fill materials and debris contain concentrations of various chemicals, such as petroleum hydrocarbons, lead, and other metals.

Regulatory Framework

Hazardous materials and hazardous wastes are extensively regulated by federal, state, regional and local regulations, with the major objective of protecting public health and the environment. In general, these regulations provide definitions of hazardous substances; identify responsible parties; establish reporting requirements; set guidelines for handling, storage, transport, remediation, and disposal of hazardous materials and wastes; and require health and safety provisions for both workers and the public, such as emergency response and worker training programs. Sites that are subject to these regulations are identified on periodically-updated published lists at the federal, state, and local levels; the regulated sites include underground storage tank locations. The major regulations relevant to the proposed master plans are summarized in the following subsections.

Federal Regulations

The United States Environmental Protection Agency (U.S. EPA) is the lead agency responsible for enforcing federal regulations that affect public health or the environment. The primary federal laws and regulations pertaining to hazardous materials and wastes include the *Resource Conservation and Recovery Act of 1976* (RCRA) and the *Hazardous and Solid Waste Amendments* enacted in 1984; the *Comprehensive Environmental Response, Compensation and Liability Act* of 1980 (CERCLA); and the *Superfund Act and Reauthorization Act* of 1986 (SARA). Federal statutes pertaining to hazardous materials and wastes are contained in the *Code of Federal Regulations* (CFR), Title 40.

State and Regional Regulations

The U.S. EPA has delegated much of its regulatory authority to the individual states. The Department of Toxic Substance Control (DTSC) of the California Environmental Protection Agency (Cal EPA), formerly a division of the Department of Health Services, enforces hazardous materials and waste regulations in California, in conjunction with the U.S. EPA. The DTSC is responsible for regulating the management of hazardous substances including the remediation of sites contaminated by hazardous substances. California hazardous materials laws incorporate federal standards, but are often stricter than federal laws. The primary state laws include: the *California Hazardous Waste Control Law* (HWCL), the state equivalent of RCRA; and the *Carpenter-Presley-Tanner Hazardous Substance Account Act* (HSAA), the state equivalent of CERCLA. State hazardous materials and waste laws are contained in the *California Code of Regulations*, Titles 22 and 26.

The San Francisco Bay Regional Water Quality Control Board (RWQCB) is authorized by the State Water Resources Control Board (SWRCB) to enforce provisions of the *Porter – Cologne Water Quality Control Act* of 1969. This act gives the RWQCB authority to require groundwater investigations when the qualities of groundwater or surface waters of the state are threatened and to remediate the site, if necessary. The Bay Area Air Quality Management District (BAAQMD) may impose specific requirements on remediation activities to protect ambient air quality from dust or other airborne contaminants.

State laws also regulate USTs and ASTs containing hazardous substances. These laws are primarily found in the Health and Safety Code, and, combined with CCR Title 23, comprise the requirements of the State UST program. The laws contain requirements for UST permitting, construction, installation, leak detection monitoring, repairs and corrective actions and closures. In accordance with state laws, the San Francisco Department of Public Health Local Oversight Program (SFDPH LOP) implements UST and AST regulations in the City and County of San Francisco.

Hazardous Materials Transport

The U.S. Department of Transportation regulates hazardous materials transportation. State agencies with primary responsibility for enforcing federal and state regulations and responding to hazardous materials transportation emergencies are the California Highway Patrol and the California Department of Transportation. Together, these agencies determine container types used and license hazardous waste haulers for hazardous material and waste transportation on public roads.

Hazardous Materials Worker Safety Requirements

The Federal Occupational Safety and Health Administration (Fed/OSHA) and the California Safety and Health Administration (Cal/OSHA) are the agencies responsible for assuring worker safety in the handling and use of chemicals in the workplace. The federal regulations pertaining to worker safety are contained in the Code of Federal Regulations, Title 29 (29 CFR) as authorized in the *Occupational Safety and Health Act* of 1970. They provide standards for safe workplaces and work practices, including standards relating to hazardous materials handling. In California, Cal/OSHA assumes primary responsibility for developing and enforcing workplace safety regulations; Cal/OSHA standards are generally more stringent than federal regulations.

The state regulations concerning the use of hazardous materials in the workplace are included in Title 8 of the *California Code of Regulations*, which contain requirements for safety training, availability of safety equipment, accident and illness prevention programs, hazardous substance exposure warnings, and emergency action and fire prevention plan preparation. Cal/OSHA also enforces hazard communication program regulations, which contain worker safety training and hazard information requirements, such as procedures for identifying and labeling hazardous substances, communicating hazard information relating to hazardous substances and their handling, and preparation of health and safety plans to protect workers and employees at hazardous waste sites.

Waste Disposal Regulations

The disposal of contaminated soil is regulated by Cal EPA and is predicated on the concentrations of the chemical constituents that are present. Soils having concentrations of contaminants higher than certain acceptable levels must be handled and disposed as hazardous waste when excavated. The *California Code of Regulations*, Title 22, §66261.20-24 contains technical descriptions of characteristics that would cause a soil to be classified as a hazardous waste.

Local Regulations

Three local ordinances meet or exceed state and federal requirements for site investigations and the storage of hazardous substances. These include *San Francisco Public Works Code*, Article 20, Section 1000 et seq. (the "Maher Ordinance"); *San Francisco Municipal Code*, Article 21 (the Hazardous Materials Ordinance); and *San Francisco Municipal Code*, Article 22 (the Hazardous Waste Ordinance). The relevant portions of Articles 20 and 22A (which effectively implement the Maher Ordinance) come into play at the time of application for Building Permit(s).

Maher Ordinance

The 1986 Maher Ordinance, as amended, requires an investigation of hazardous materials in soil at certain construction sites as a prerequisite for any building permit. The Maher Area encompasses the area of the city Hayward of a historic, pre-1906 earthquake high tide line. This area is largely the part of San Francisco created by landfill where past industrial land uses and debris fill associated with the 1906 earthquake and Bay reclamation often left hazardous residue in local soils and groundwater.

The Maher Ordinance requires that, if more than 50 cubic yards of soil are to be disturbed and the project is on fill, or is at a location designated for investigation by the director of the Department of Public Health, applicants for building permits must, among other things, prepare a site history and analyze the site's soil for hazardous materials. Portions of the project site are located within the boundaries of the Maher Ordinance; however, it would not be subject to the Maher Ordinance if an excess of 50 cubic yards of fill material soils would not be disturbed.

Hazardous Materials Ordinance

The Hazardous Materials Ordinance provides for safe handling of hazardous materials in San Francisco. Any person or business that handles, sells, stores, or otherwise uses hazardous materials in quantities exceeding specified thresholds and for specified periods, is required by Article 21 to register the hazardous materials with the San Francisco Department of Public Health and prepare and implement certain plans and reporting procedures.

Hazardous Waste Ordinance

The Hazardous Waste Ordinance provides for safe handling of hazardous wastes in San Francisco. The ordinance incorporates the state requirements for hazardous waste described in Section 6.5 (Hazardous Waste Management) of the *California Health and Safety Code*, as well as the accompanying regulations found in CCR Title 22.

San Francisco Building Code – Chapter 36

Construction and renovation activities must comply with Chapter 36 of the San Francisco Building Code, Work Practices for Exterior Lead-Based Paint. If any work as part of the project would disturb or remove lead paint on the exterior of a building constructed prior to December 31, 1978, Chapter 36 requires specific notification and work standards, and identifies prohibited work methods and penalties. Chapter 36 applies to buildings or steel structures constructed prior to 1979 (which are assumed to have lead-based paint on their surfaces), where more than ten total square feet of lead-based paint would be disturbed or removed. The regulating ordinance contains performance standards, including establishment of containment barriers that are at least as effective at protecting human health and the environment as those in the most recent *Guidelines for Evaluation and Control of Lead-Based Paint Hazards* promulgated by the United States Department of Housing and Urban Development.

3.8.2 IMPACT ANALYSIS

Criteria of Significance

This EIR uses the following hazardous materials criteria to assess whether proposed improvements in the SFCTA Expenditure Plan would have a significant adverse effect:

- **Criterion 1:** Creation of a potential public health hazard, or an increased risk of exposure to hazardous materials or waste.
- **Criterion 2:** Interfere with emergency response plans or emergency evacuation plans.

Method of Analysis

Impacts are determined for the Expenditure Plan as a whole and for specific projects involving new construction. Transportation project locations have been compared to general locations of potential contamination from various sources. Figure 3.8-1 provides broad information on areas of potential hazardous materials contamination.

For purposes of this analysis, construction in open space and primarily residential areas is considered to have a "low potential" to encounter hazardous materials. Because of relatively low density and because it is known that historically, these areas have been solely used for residential and open space purposes. It should be noted that cases of contamination (such as leaking underground storage tanks from gasoline stations) may still be encountered in areas of "low potential"; however, the overall likelihood to encounter contamination is generally less than in other areas in San Francisco. Areas within and immediately surrounding the Presidio are shown as having a moderate potential to uncover contamination (see Figure 3.8-1). While it is known that former military uses at the Presidio caused contamination, and site remediation in many areas has either been completed or is currently underway, there is a moderate potential to encounter previously undocumented areas impacted hazardous materials, such as those associated with unmapped military dumps.

Areas used for commercial and mixed-use purposes (generally includes gas station, dry cleaners, and film developers) are considered to have a "moderate potential" to encounter hazardous materials during construction. Areas of San Francisco that contain commercial and mixed uses generally have a higher density pattern. These areas were developed prior to other uses as described above (residential and open space) and the history of their uses is often uncertain. These areas are more likely to contain uses, such as gasoline stations, dry cleaners, and film developers that could have, in the past, used hazardous materials.

Areas within the boundaries of the Maher Ordinance (see Figure 3.8-1) as well as primarily industrial areas are considered to have a "high potential" to encounter hazardous materials during construction activities. Areas within the Maher Ordinance were created by fill material that could possibly contain debris from the 1906 earthquake and fire. It is likely that these fill and debris materials contain concentrations of various chemicals such as petroleum hydrocarbons, lead, and other materials. Areas that contain primarily industrial uses are considered more likely than commercial or mixed use areas to generate and dispose of hazardous materials. While contamination may not be encountered at all locations of project construction in the "high potential" areas, the overall likelihood to encounter contamination is generally greater than in areas of "moderate potential" or "low potential." Due to the scale of these maps, this analysis should be used in the most general sense; this analysis does not satisfy the need for site-specific surveys for individual projects.

Summary of Impacts

The City and County of San Francisco is susceptible to impacts associated with hazardous materials. New and existing transportation projects would be exposed to both the direct and indirect effects of hazardous materials exposure. Potential effects from hazardous materials contamination or use could pose a hazard to people, animal, or plant populations in the affected area. Hazardous materials exposure during construction would be considered short-term, while long-term impacts would be expected to continue throughout the life of the project or facility (project operations). The impact analysis in this section addresses both short-term and long-term hazardous materials impacts.

The Expenditure Plan includes a wide range of project types including the building of new facilities throughout the City, retrofitting existing facilities and stations, retrofitting, upgrading, installing and replacing tracks, signs, furniture, markings, and other improvements, throughout the City.

Direct Impacts

Direct impacts associated with hazardous materials include the construction of new transportation facilities that could disturb impacted soil and/or groundwater and allow the potential increased handling of hazardous materials. Construction and operation of new transportation facilities could expose construction workers, the public, or the environment to hazardous conditions. Construction activities could also disturb structural and building components that could expose construction workers, the public, or the environment to hazardous conditions.

Short Term Impacts

Short-term impacts are those that could potentially occur during construction of transportation facilities and improvements. Exposure to hazardous materials during demolition and excavation activities could expose humans and the environment to potentially hazardous conditions.

Long Term Impacts

Long-term impacts are those that could potentially occur during the operation of the proposed transportation facilities and improvements. Exposure to hazardous materials, such as petroleum products, fuels, spent oil, and solvents used during project operations, could expose humans and the environment to potentially hazardous conditions.

3.8.3 SIGNIFICANT IMPACTS AND MITIGATION MEASURES

SFCTA requires project sponsors to comply with CEQA and NEPA prior to project approval by SFCTA. The following mitigation measures should be included in project-level analysis as appropriate for proposed new transportation improvements. The project proponent or local jurisdiction shall be responsible for ensuring adherence to the mitigation measures outlined below prior to construction.

*Impact 3.8-a: **Construction activities requiring the use of hazardous materials may increase the risk of exposure to hazardous materials. (Significant, mitigable)***

Construction activities would require the use of certain hazardous materials such as fuels, oils, solvents, and glues. Exposure or inadvertent release of large quantities of these materials into the environment could expose construction workers or the public to potentially hazardous conditions and adversely impact soil, surface waters, or groundwater quality. Potential impacts associated with use and potential inadvertent releases of hazardous materials during construction activities would be a significant mitigable impact.

Mitigation Measures

H-1 SFCTA shall require project proponents to utilize best management practices and prepare a construction health and safety plan—as required by Cal OSHA—that describes all hazardous materials used during construction and their associated health hazards.

Best management practices could include the following:

- Follow manufacturer's recommendations and regulatory requirements for use, storage and disposal of chemical products and hazardous materials used in construction;
- Avoid overtopping construction equipment fuel gas tanks;
- During routine maintenance of construction equipment, properly contain and remove grease and oils.
- Properly dispose of discarded containers of fuels and other chemicals.

Significance After Mitigation

Implementation of the mitigation measure would reduce impacts associated with hazardous materials used during construction to a less than significant level.

Impact 3.8-b: Construction excavation could encounter contaminated materials, causing an increase in risk of exposure to hazardous materials. (Significant, mitigable)

Excavation during construction activities for transportation facilities would occur. Disturbance of impacted soils or groundwater during project construction work could expose construction workers, the public, or the environment to hazardous conditions. Soil disturbance during construction could further disperse contamination into the environment and expose construction workers or the public to these contaminants. Transportation projects that would disturb soils, especially in areas of industrial use and within the Maher Ordinance boundaries (i.e., Third Street Subway, Third Street LRT, and the Caltrain Extension) have an increased potential to encounter contamination. This would be a significant mitigable impact of the proposed Expenditure Plan.

Mitigation Measures

H-2 SFCTA shall require project proponents to undertake project-level analyses as appropriate for proposed new transportation improvements, and require project proponents to comply with applicable federal, State, and local regulations. As appropriate to the environmental review of specific projects, typical compliance activities would include the following:

- For proposed Expenditure Plan projects, within the area covered under the Maher Ordinance, compliance with the Maher Ordinance requires testing of subsurface soil to determine the magnitude and extent of soil contamination.
- For construction corridors that are located on or intersect a site listed with the RWQCB or SFDPH LOP as containing known or suspected hazardous materials subsurface impacts, collect soil samples in order to determine the potential extent of contaminated soil which will be disturbed during construction activities. Soil sampling plans and activities shall be subject to approval and oversight of the RWQCB or SFDPH LOP. Should construction activities intersect contaminated soil, removal and disposal of contaminated soil shall occur in accordance with all applicable regulatory requirements.
- If any USTs are discovered during construction, all construction shall stop until the UST is removed under the guidance of the SFDPH LOP. Such removal shall include the over-excavation and disposal of any impacted soil that may be associated with such tanks to a degree sufficient to SFDPH LOP.
- Full compliance with all applicable regulatory agency requirements, including those set forth by SFDPH LOP, the RWQCB, and the California DTSC regarding the potential re-use of impacted artificial fill, and the storage and transportation of impacted soil and groundwater.
- Construction activities involving excavation that will proceed below the groundwater table may intercept groundwater, which has been impacted by hazardous materials. Groundwater dewatering activities shall comply with Mitigation Measure W-2, as discussed in Water Resources Section 3.11, which requires the project proponent to obtain a permit from the RWQCB or San Francisco Department of Public Works prior to discharge of groundwater to local water bodies or San Francisco's stormwater/sewer system, respectively.
- Create a project and site-specific health and safety plan. This health and safety plan shall discuss and address construction worker exposure to potential hazardous materials or impacted soil and groundwater which may be encountered during construction activities, based upon known or suspected contaminated sites, as discussed in Mitigation Measure H-1.

Significance After Mitigation

With implementation of the mitigation measure, the impact would be reduced to less than significant.

Impact 3.8-c: Disturbance of structural and building components (i.e., asbestos, lead, PCBs, and PAHs) could expose construction workers, the public, or the environment to hazardous conditions. (Significant, mitigable)

Expenditure Plan projects in areas underlain by fill have a high potential to uncover any of these contaminants. This is a significant mitigable impact.

Mitigation Measures

H-3 SFCTA shall require project proponents to undertake environmental review of specific projects, and where disturbance of structural or building components is involved, undertake the following steps, as appropriate to the environmental review of specific projects:

- Prior to the demolition of any building, a pre-demolition asbestos containing material (ACM), lead-based paint (LBP), and PCB survey shall be performed, in accordance with State and local standards. Abatement of PCBs, known or suspected ACMs, and loose or peeling LBP in accordance with State and Local standards shall occur prior to demolition or construction activities that would disturb those materials. Survey and abatement of these substances shall be conducted in accordance with a health and safety plan, as required by Cal OSHA.
- Precautions and work practices in compliance with the San Francisco Building Code, Chapter 36, shall be initiated to appropriately handle areas identified as containing lead-based paint.
- Full compliance with notification requirements under applicable federal regulations regarding hazardous air pollutants, including asbestos shall be required. The Bay Area Air Quality Management District is vested by the California legislature with authority to regulate airborne pollutants, including asbestos, through both inspection and law enforcement, and is to be notified ten days in advance of any proposed demolition or abatement work.
- PCB-, PAH-, lead- and asbestos-containing material, shall be disposed of in accordance with all applicable laws and regulations.

Significance After Mitigation

With implementation of the mitigation measure, the impact would be reduced to less than significant.

Impact 3.8-d: Expenditure Plan projects would decrease the risk of human exposure and environmental release of a hazardous material. (Beneficial)

Implementation of the proposed transportation facilities would reduce the amount of petroleum and fuel products consumed in the City and County of San Francisco both directly and indirectly. Transportation projects such as the conversion of Caltrain locomotives from diesel-powered to electric-powered would reduce the amount of diesel fuel used and handled within the City and County of San Francisco. This would decrease the risk of human exposure and environmental release of a hazardous material.

3.9 NOISE

Similar to other Bay Area cities, the primary source of environmental noise in San Francisco is from transportation—motor vehicles, transit systems, railroads, aircraft and boats. Automobile and truck traffic is the most prevalent noise source throughout the region's urban communities. Noise can have real effects on human health, including hearing loss and the psychological effects or irritability from lack of sleep. This chapter outlines how noise is described, measured, and regulated. It also describes the sources of transportation noise in San Francisco and evaluates the potential effect of transportation improvements in the proposed Expenditure Plan on noise levels within the region.

3.9.1 SETTING

Noise Descriptors

Sound waves, traveling outward from a source, exert a sound pressure level (commonly called "sound level"), measured in decibels (dB). In general, people can perceive a two- to three-dB difference in noise levels; a difference of 10 dB is perceived as a doubling of loudness. "Noise" is often defined as unwanted sound. Environmental noise is usually measured in A-weighted decibels; a metric corrected for the variation in frequency response of the human ear. The A-weighted scale is used to describe all noise levels discussed in this section.

Environmental noise levels typically fluctuate over time; different types of noise descriptors are used to account for this variability. Some descriptors characterize cumulative noise over a given period, while others describe single noise events. Cumulative noise descriptors include the energy-equivalent noise level (Leq), Day-Night Average Noise Level (DNL), and Community Noise Equivalent Level (CNEL). The Leq is the actual time-averaged, equivalent steady-state sound level, which, in a stated period, contains the same acoustic energy as the time-varying sound level during the same period. Some representative noise sources and their corresponding A-weighted noise levels are shown in Table 3.9-1.

DNL and CNEL values result from the averaging of Leq values (based on A-weighted decibels) over a 24-hour period, with weighting factors applied to different periods of the day to account for their greater relative annoyance. For DNL, noise that occurs during the nighttime period (10:00 p.m. to 7:00 a.m.) is penalized by 10 dB. The CNEL descriptor is similar to DNL, except that it also includes a penalty of approximately 5 dB for noise that occurs during the evening period (7:00 p.m. to 10:00 p.m.). Cumulative noise descriptors, DNL and CNEL, are well correlated with the likelihood of public annoyance from transportation noise sources.

Table 3.9-1: Effects of Noise on People

Noise Level (dBA, Leq)	*Common Indoor Noise Levels*	*Common Outdoor Noise Levels*	*Public Reaction*
0	Threshold of Hearing		
10	Broadcast and Recording Studio		
20	Concert Hall (Background)	Quiet Rural Nighttime	
30	Library	Quiet Suburban Nighttime	
40	Small Theater, Large Conference Room (background)	Quiet Urban Nighttime	
50	Dishwasher Next Room	Quiet Urban Daytime	Acceptance
60	Large Business Office	Commercial Area, Heavy Traffic at 300 feet	Complaints Rare
70	Vacuum Cleaner at 10 feet	Gas Lawn Mower at 100 feet	Complaints Possible
80	Garbage Disposal at 3 ft, Shouting at 3 ft.	Noisy Urban Daytime	Complaints Likely
90	Food Blender at 3 ft.	Gas Lawn Mower at 3 ft, Diesel truck at 50 ft.	Letters of protest
100	Inside Subway Train (New York)	Jet Flyover at 1000 ft.	Local Committee Activity with Influential or Legal Action
110	Rock Band		

Source: Caltrans Transportation Laboratory Noise Manual, 1982; Modification by Environmental Science Associates.

Sound Propagation and Attenuation

Sound level naturally decreases as one moves away from the source. This basic attenuation rate is referred to as the geometric spreading loss. The basic rate of geometric spreading loss depends on whether a given noise source can be characterized as a point source or a line source. For a point source, such as an idling truck or jackhammer, the noise level decreases by about 6.0 dB for each doubling of distance away from the source.

In many cases, noise attenuation from a point source increases by 1.5 dB from 6.0 dB to 7.5 dB for each doubling of distance due to ground absorption and reflective wave canceling. These factors are collectively referred to as excess ground attenuation. The basic geometric spreading loss rate is used where the ground surface between a noise source and a receiver is reflective, such as parking lots or a smooth body of water. The excess ground attenuation rate (7.5 dB per doubling of distance) is used where the ground surface is absorptive, such as soft dirt, grass, or scattered bushes and trees.

For a line source, such as a heavily traveled roadway, the noise level decreases by a nominal value of 3.0 dB for each doubling of distance between the source and the receiver. If the ground surface between source and receiver is absorptive rather than reflective, the nominal rate increases by 1.5 dB to 4.5 dB for each doubling of distance. Atmospheric effects, such as wind and temperature gradients, can also influence noise attenuation rates from both line and point sources of noise.

However, unlike ground attenuation, atmospheric effects are constantly changing and difficult to predict.

Trees and vegetation, buildings, and barriers reduce the noise level that would otherwise occur at a given receptor distance. A row of structures can shield more distant receivers depending upon the size and spacing of the intervening structures and site geometry. Generally, a noise barrier that breaks the line of sight between source and receiver will provide at least a 5-dB reduction in noise.

Effects of Noise

Human reaction to noise ranges from annoyance, to interference with various activities, to hearing loss and stress-related health problems. These effects of noise are discussed below:

- Potential hearing loss is commonly associated with occupational exposures in heavy industry or very noisy work environments. Noise levels in neighborhoods, even near very noisy airports, are not sufficiently loud to cause hearing loss.
- Speech interference is one of the primary concerns associated with environmental noise. Normal conversational speech is in the range of 60 to 65 dB and any noise in this range or louder may interfere with speech. Depending upon the distance between the talker and the listener, background noise levels may require a raised voice in order to communicate. Transportation sources can easily interfere with conversation within a few hundred feet of the source.
- Sleep interference is a major noise concern related to traffic-generated noise. Sleep disturbance studies have identified interior noise levels attributed to traffic noise as a key factor of sleep disturbance. However, it should be noted that sleep disturbance does not necessarily mean awakening from sleep, but can refer to altering the pattern and stages of sleep. Train noise (especially horn soundings) is a major source of complaints.
- Physiological responses are those measurable noise effects on the human metabolism. They are ascertained as changes in pulse rate, blood pressure, etc. While such effects can be induced and observed, the extent to which these physiological responses cause harm or are a sign of harm is not known.
- Annoyance is the most difficult of all noise responses to describe. Annoyance is a very individual characteristic and can vary widely from person to person. What one person considers tolerable can be quite unbearable to another of equal hearing capability. (For instance, some people like the sound of trains, while others do not.)

Sensitive Receptors

People in residences, motels and hotels, schools, libraries, churches, hospitals, nursing homes, auditoriums, natural areas, parks and outdoor recreation areas are generally more sensitive to noise than are people at commercial and industrial establishments. Consequently, the noise standards for sensitive land uses are more stringent than for those at less sensitive uses. Sensitive receptors of all types are located within San Francisco's travel corridors.

To protect various human activities in sensitive areas (e.g., residences, schools, and hospitals), lower noise levels are generally required. For example, a maximum outdoor noise level of 55 to 60 DNL is necessary for intelligible speech communication inside a typical home. Social surveys and case studies have shown that complaints and community annoyance in residential areas begin to occur when outdoor noise reaches 55 DNL (U.S. EPA, 1981). Sporadic complaints associated with the 55 to 60 DNL range give rise to widespread complaints within the 60 to 70 DNL range. At 70 DNL and above, residential community reaction typically involves threats of legal action and strong appeals to local officials to stop the noise.

Existing Noise Sources

Principal noise sources in San Francisco are freeways, arterial roadways, port facilities, railroads and aircraft over flights from the San Francisco International Airport. Additional noise generators include industrial manufacturing plants and construction sites. Local collector streets are not considered to be a significant source of noise since traffic volume and speed are generally much lower than for freeways and arterial roadways.

Freeways and Arterial Roadways

Vehicle traffic background noise levels vary throughout the day based on the average density of noise sources in a given area. Traffic noise at a particular location depends upon the traffic volume on nearby roadways, the average vehicle speed, distance between the receptor and the roadway, the presence of intervening barriers between source and receiver, and the ratio of trucks (particularly heavy trucks) and buses to automobiles.

Several factors control how traffic noise levels affect nearby sensitive land uses. These include roadway elevation compared to grade; structures or terrain intervening between the roadway and the sensitive receptors; and the distance between the roadway and receptors. For example, measurements show that depressing a freeway by approximately 12 feet yields a reduction in traffic noise relative to an at-grade freeway of 7 to 10 dB at all distances from the freeway (Beranek, 1988). Traffic noise from an elevated freeway is typically 2 to 10 dB lower than an equivalent at-grade facility within 300 feet of the freeway. However, beyond 300 feet, the noise radiated by an elevated and at-grade freeway (assuming equal traffic volumes, truck mix, and vehicle speed) is the same (Beranek, 1988). Caltrans or other sponsors of freeway projects conduct detailed noise studies for their environmental documents when these projects are ready for implementation.

Major freeways connecting San Francisco with other parts of the Bay Area are Interstate 80, Interstate 280, and U.S. 101. San Francisco has numerous arterial roadways. Major arterials providing crosstown access within the City include 19th Avenue/Park Presidio Boulevard (Highway 1), Van Ness/Lombard (U.S. 101), the Embarcadero, Geary Boulevard, Ocean Avenue, Portola Drive, Market and Mission Streets, and 3rd Street.

Typical arterial roadways have one or two lanes of traffic in each direction, with some containing as many as four lanes in each direction. Noise from these sources can be a significant environmental concern where buffers (e.g., buildings, landscaping, etc.) are inadequate or where the distance from centerline to sensitive uses is relatively small. Given typical daily traffic volumes of 10,000 to 40,000, noise levels along arterial roadways typically range from DNL 65 to 70 dB at a distance of 50 feet from the roadway centerlines. In some cases, traffic noise is so pervasive that it can depress property values for residential uses.

Railroad Operations

The two basic types of railroad operations are freight trains, and passenger rail operations, the latter consisting of commuter and intercity passenger trains and steel-wheel urban rail transit. Generally, freight operations occur at all hours of the day and night, while passenger rail operations are concentrated within the daytime and evening periods.

Trains can generate high, relatively brief, intermittent noise events. Train noise is an environmental concern for sensitive uses located along rail lines and in the vicinities of switching yards. Locomotive engines and the interaction of steel wheels and rails generate primary rail noise. The latter source creates three types of noise: 1) rolling noise due to continuous rolling contact; 2) impact noise when a wheel encounters a rail joint, turnout or crossover; and 3) squeal generated by friction on tight curves. For very high-speed rail vehicles, air turbulence can be a significant source of noise (U.S. Department of Transportation, 1995).

Train air horns and crossing bell gates contribute to loud noise levels near grade crossings. Table 3.9-2 provides reference noise levels in terms of Sound Exposure Levels (SEL) for different types of rail operations.

Table 3.9-2: Reference Noise Levels for Various Rail Operations

Source/Type		*Reference Conditions*	*Reference Noise Level (SEL)*[a]
Commuter Rail, At-Grade (e.g., CalTrain)	Locomotives	Diesel-Electric, 3,000 horsepower, throttle 5	92
		Electric	90
	Cars	Ballast, welded rail	82
Rail Transit (e.g., BART)		At-grade, ballast, welded rail	82
Automated Guideway Transit	Steel wheel	Aerial, concrete, welded rail	80
	Rubber tire	Aerial, concrete guideway	78
Monorail		Aerial straddle beam	82
Maglev		Aerial, open guideway	72

[a] Measured at 50 feet from track centerline with trains operating at 50 miles per hour. For the sake of comparison, an automobile passby event generates an SEL of approximately 73 dB, and a city bus generates an SEL of approximately 84 dB.

Source: U.S. Department of Transportation, Federal Transit Administration, Transit Noise and Vibration Impact Assessment, 1995.

Freight Trains

Freight trains are a source of environmental noise particularly along the eastern waterfront of San Francisco. Freight train noise consists of locomotive engine sound and rail car wheel-rail interaction. In addition to noise, freight trains also generate substantial ground-borne noise and vibration near the tracks. Ground-borne noise and vibration is a function of quality of the track and the operating speed of the vehicles.

Commuter and Intercity Passenger Trains

Caltrain is the only commuter and intercity passenger train that serves San Francisco. Caltrain trains are diesel powered and noise is generated by the diesel engines and from sounding horns/whistles and gate bells as trains approach an intersection. Other components of noise include diesel exhaust, cooling fans, and wheel/rail interaction.

Heavy and Light Rail Transit

Heavy rail is generally defined as electrified rapid transit trains with dedicated guideway, and light rail as electrified transit trains that do not require dedicated guideway. In general, noise increases with speed and train length, and is most problematic within 50 feet of the track. BART is the core heavy-rail transit network serving the Bay Area with only one route (along Market Street) serving San Francisco. Dominant noise components from BART trains are the wheel/rail interaction and guideway amplification, propulsion system, brakes, auxiliary equipment and wheel squeal. BART trains, operating at- or above-grade, typically generate noise levels of about 70 DNL at a distance of 100 feet from the tracks. The DNL drops to about 60 dBA at a distance of 400 feet. San Francisco is also served by light rail transit by the San Francisco Municipal Railway (MUNI). SF MUNI operates modern light-rail electric streetcars (some of them in subways), historic streetcars, diesel buses, electric trolley buses and cable cars. MUNI's streetcar network serves mostly relatively, lower-density, outlying areas, while higher density neighborhoods near downtown are served more by buses. Light rail noise levels vary, depending upon vehicle speed, number of cars per train, and whether the trains operate on embedded or tie-and-ballast trackway. The distance to the 60 DNL contour for light rail is typically 100 to 150 feet from the tracks.

Port of San Francisco

The Port of San Francisco is one of the major regional economic development centers of the Bay Area. Noise is generated from several sources: ships using the port facilities, equipment from cargo activity at the port, and truck and rail traffic from cargo moving through the ports. All sources affect the ambient noise levels in the vicinity of the port areas along San Francisco's eastern waterfront.

Construction Noise Sources

Construction can be another significant, although typically short-term, source of noise. Construction is most significant when it takes place near sensitive land uses, occurs at night, or in early morning hours. As discussed above, local governments typically regulate noise associated with construction equipment and activities through enforcement of noise ordinance standards, implementation of general plan policies, and imposition of conditions of approval for building or grading permits. Table 3.9-3 shows typical exterior noise levels at various phases of commercial construction, and Table 3.9-4 shows typical noise levels associated with various types of construction related machinery.

Table 3.9-3: Typical Construction Phase Noise Levels

Construction Phase	*Noise Level (dBA, Leq)*[a]
Ground Clearing	84
Excavation	89
Foundations	78
Erection	85
Finishing	89

[a] Average noise levels 50 feet from the noisiest source and 200 feet from the rest of the equipment associated with a given construction phase. Noise levels correspond to commercial projects in a typical urban ambient noise environment.

Source: Bolt, Beranek and Newman, U.S. EPA, Noise From Construction Equipment and Operations, Building Equipment, and Home Appliances, 1971.

Table 3.9-4: Typical Noise Levels from Construction Equipment

	Noise Levels (dBA at 50 feet)	
Construction Equipment	*Without Noise Control*	*With Feasible Noise Control*[a]
Earthmoving		
Front Loaders	79	75
Backhoes	85	75
Dozers	80	75
Tractors	80	75
Scrapers	88	80
Graders	85	75
Trucks	91	75
Pavers	89	80
Materials Handling		
Concrete Mixers	85	75
Concrete Pumps	82	75
Cranes	83	75
Derricks	88	75
Stationary		
Pumps	76	75
Generators	78	75
Compressors	81	75
Impact		
Pile Driver	101	95

Table 3.9-4: Typical Noise Levels from Construction Equipment

	Noise Levels (dBA at 50 feet)	
Construction Equipment	*Without Noise Control*	*With Feasible Noise Control*[a]
Jack Hammers	88	75
Rock Drills	98	80
Pneumatic Tools	86	80
Other:		
Saws	78	75
Vibrators	76	75

[a] Feasible noise controls represent estimates obtained by using quieter procedures or equipment and noise control features that would require no major design or extreme cost. Quieted equipment can be designed with enclosures, mufflers, or noise-reduction features.

Source: Bolt, Beranek and Newman, U.S. EPA, Noise From Construction Equipment and Operations, Building Equipment, and Home Appliances, 1971.

The dominant construction equipment noise source is usually a diesel engine, without sufficient muffling. In a few cases however, such as impact pile driving or pavement breaking, process noise dominates. Stationary equipment operates in one location for one or more days at a time, with either a fixed-power operation (pumps, generators, compressors) or a variable noise operation (pile drivers, pavement breakers). Mobile equipment moves around the construction site with power applied in cyclic fashion (bulldozers, loaders), or to and from the site (trucks). Construction-related noise levels generally fluctuate depending on the construction phase, equipment type and duration of use, distance between noise source and receptor, and presence or absence of barriers between noise source and receptor.

Policy and Regulation

Federal, state, and local agencies regulate different aspects of environmental noise. Generally, the federal government sets noise standards for transportation-related noise sources closely linked to interstate commerce. These include aircraft, locomotives, and trucks. The state government sets noise standards for those transportation noise sources such as automobiles, light trucks, and motorcycles. Noise sources associated with industrial, commercial, and construction activities are generally subject to local control through noise ordinances and general plan policies. Local general plans identify general principles intended to guide and influence development plans, and noise ordinances set forth the specific standards and procedures for addressing particular noise sources and activities.

Federal Regulations

Federal regulations for railroad noise are contained in 40 CFR, Part 201 and 49 CFR, Part 210. Noise limits are implemented through regulatory controls on locomotive manufacturers. For locomotives manufactured during or after 1980, noise limits are as follows:

- Stationary locomotives (at idle throttle setting) are not to exceed 70 dB at 15 meters (approximately 50 feet) from the track pathway centerline;

- Stationary locomotives (at all other throttle settings) are not to exceed 87 dB at 15 meters;
- Moving locomotives are not to exceed 90 dB at 15 meters.

Sounding locomotive horns or whistles in advance of highway-rail grade crossings has been used as a safety precaution by railroads since the late 1880s. In response to a growing national trend towards restrictions on the use of locomotive horns under local ordinances and a related increase in collisions, Congress passed the Swift Rail Development Act, which directed the Federal Railroad Administration to develop rules addressing this issue. In January 2000, the Federal Railroad Administration published a proposed rule that would require use of locomotive horns or whistles when approaching public road/rail grade crossings, except in approved quiet zones, where supplementary safety measures have been installed or adopted by the state or locality. The proposed rule would also establish an upper limit (104 or 111 dB) for the loudness of train horns (Federal Railroad Administration, 2000).

The Federal truck passby noise standard is 80 dB at 15 meters from the vehicle pathway centerline (trucks more than 4.5 tons, gross vehicle weight rating, under 40 CFR, Part 205, Subpart B). This standard is implemented through regulatory controls on truck manufacturers. Under regulations established by the Federal Highway Administration, noise abatement must be considered for federal or federally-funded projects involving the construction of a new highway or significant modification of an existing freeway. Abatement is considered when the project would result in a substantial noise increase or when the predicted noise levels approach or exceed the Noise Abatement Criteria (23 CFR Part 772). Under this criteria, a substantial increase is defined as a 12 dB increase in the Leq during the traffic peak hour. The Noise Abatement Criteria differ among various activity categories and between exterior spaces and interior spaces. For sensitive uses, such as residences, schools, churches, parks, and playgrounds, the Noise Abatement Criteria for interior and exterior spaces during the traffic peak hour is 57 and 67 Leq, respectively.

State Regulations

The State of California establishes noise limits for vehicles licensed to operate on public roads. For heavy trucks, the passby standard is consistent with the federal limit of 80 dB. The State passby standard for light trucks and passenger cars (less than 4.5 tons, gross vehicle rating) is also 80 dB at 15 meters from the centerline (California Vehicle Code, §23130 and 23130.5; 27150, et seq.; 27204 and 27206). These controls are implemented through controls on vehicle manufacturers and by legal sanction of vehicle operators by state and local law enforcement officials. Caltrans uses FHWA Noise Abatement Criteria to evaluate noise impacts.

The State has also established noise insulation standards for new multi-family residential units, hotels, and motels that would be subject to relatively high levels of transportation-related noise. These requirements are collectively known as the California Noise Insulation Standards and are found in California Code of Regulations, Title 24. These standards set forth an interior standard of 45 DNL in any habitable room.

Local Regulations

Ground transportation noise from buses, trucks, motorcycles, and poorly muffled automobiles predominate over other types of noise as the most persistent cause for complaint. To address this issue, Section 6530 (g) of the California Government Code, requires all cities and counties to include a transportation noise element in their general plans. The Transportation Noise Element within the Environmental Protection Element of the San Francisco General Plan is designed to comply with this law. It contains objectives and policies to reduce or eliminate the effects of excessive noise in the community. These goals and policies are summarized below (City of San Francisco, 1997):

Objective 9: Reduce Transportation noise.

Policy 1: Enforce noise emission standards for vehicles.

Policy 2: Impose traffic restrictions to reduce transportation noise.

Policy 3: Limit City purchases of vehicles to models with the lowest noise emissions and adequately maintained City-owned vehicles and travel surfaces.

Policy 4: Reduce use of emergency sirens.

Policy 5: Retain and expand the electric trolley network.

Policy 6: Discourage changes in streets, which will result in greater traffic noise in noise-sensitive areas.

Objective 10: Minimize the impact of noise on affected areas.

Policy 1: Promote site planning, building orientation and design, and interior layout that will lessen noise intrusion.

Policy 2: Promote the incorporation of noise insulation materials in new construction.

Policy 3: Construct physical barriers to reduce noise transmission from heavy traffic carriers.

Objective 11: Promote land uses that are compatible with various transportation noise levels.

Policy 1: Discourage new uses in areas in which the noise level exceeds the noise compatibility guidelines for that use.

Policy 2: Consider the relocation to more appropriate areas of those land uses which need more quiet and cannot be effectively insulated from noise in their present location, as well as those land uses which are noisy and are presently in noise-sensitive areas.

Policy 3: Locate new noise-generating development so that the noise impact is reduced.

The *San Francisco General Plan* also contains guidelines for determining the compatibility of various land uses with different noise environments (see Table 3.9-5). The guidelines recognize that some land uses are more sensitive to ambient noise levels than others, due to the amount of noise exposure (in terms of both exposure duration and insulation from noise) and the types of activities typically involved. The table lists normally acceptable, conditionally acceptable, normally unacceptable, and clearly unacceptable noise levels for a variety of uses.

Table 3.9-5: Land Use Compatibility Chart for Community Noise, DNL or CNEL in dBA

Land Use Category	*Normally Acceptable* [a]	*Conditionally Acceptable* [b]	*Normally Unacceptable* [c]	*Clearly Unacceptable* [d]
Residential – All Dwellings, Group Quarters	< 60	60 - 70	> 65	—
Transient Lodging – Hotels, Motels	< 60	60 - 80	> 75	—
School Classrooms, Libraries, Churches, Hospitals, Nursing Homes, Etc.	< 65	62.5 - 70	—	> 65
Auditoriums, Concert Halls, Amphitheatres, Music Shells	—	< 70	—	> 65
Sports Arena, Outdoor Spectator Sports	—	< 77.5	—	> 72.5
Playgrounds, Parks	< 70	—	67.5 – 77.5	> 75
Golf Courses, Riding Stables, Water-Based Recreation Areas, Cemeteries	< 75	—	72.5 - 85	> 80
Office Buildings – Personal, Business and Professional Services	< 70	65 - 75	> 72.5	—
Commercial – Retail, Movie Theatres, Restaurants	< 70	67.5 - 80	> 77.5	—
Commercial – Wholesale and Some Retail, Industrial/Manufacturing, Transportation, Communications and Utilities	< 77.5	75 – 87.5	> 82.5	—
Manufacturing – Noise Sensitive	< 70	65 - 80	> 70	—
Communications – Noise Sensitive				

[a] Normally Acceptable – Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.

[b] Conditionally Acceptable – New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design.

[c] Normally Unacceptable – New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design.

[d] Clearly Unacceptable – New construction or development clearly should not be undertaken.

Source: San Francisco General Plan, Environmental Protection Element, April 1997; Environmental Science Associates, 2003.

For many land uses, the compatibility guidelines show overlapping DNL ranges for two or more categories. These overlapping DNL ranges indicate that local conditions (existing noise levels and community attitudes toward dominant noise sources) should be considered in evaluating land use compatibility at specific locations.

In addition to regulating noise through implementation of noise element policies, short-term noise in San Francisco is regulated by compliance with the San Francisco Noise Ordinance (Article 20 of the City Police Code, Section 2907b). The Noise Ordinance limits construction noise (i.e., powered construction equipment other than impact tools) to 80 dBA at 100 feet. , which The Noise Ordinance (Section 2908) also prohibits construction work at night from 8:00 p.m. until 7:00 a.m., if noise from such work would exceed the ambient noise level by five dB at the property line, unless a special permit is authorized by the San Francisco Department of Public Works.

3.9.2 IMPACT ANALYSIS

Criteria of Significance

This EIR uses the following criteria to assess whether the proposed transportation improvements in the Expenditure Plan will have a significant adverse effect on the community noise environment:

- **Criterion 1:** Construction. Construction associated with implementation of the Expenditure Plan would have a potentially significant impact if it results in noise levels that would lead to a violation of the San Francisco General Plan and noise ordinance standards.
- **Criterion 2:** Highways. Implementation of the Expenditure Plan would have a potentially significant impact if it results in noise levels that approach or exceed the FHWA Noise Abatement Criteria or increase substantially above existing levels (a 3 dB change would be considered noticeable).
- **Criterion 3:** Rail Transit. Implementation of the Expenditure Plan would have a potentially significant impact if it results in noise levels that increase by more than the allowable noise exposure permitted under the Federal Transit Administration (FTA) criteria, as shown in Table 3.9-6, below.

Table 3.9-6: Noise Impact Criteria - Effect on Cumulative Noise Exposure

Ldn or Leq in dBA (rounded to nearest whole decibel)			
Existing Noise Exposure	*Allowable Project Noise Exposure*	*Allowable Combined Total Noise Exposure*	*Allowable Noise Exposure Increase*
45	51	52	7
50	53	55	5
55	55	58	3
60	57	62	2
65	60	66	1
70	64	71	1
75	65	75	0

Source: Office of Planning, Federal Transit Administration, Transit Noise and Vibration Impact Assessment Final Report, 1995.

Method of Analysis

Because noise is a highly localized impact, specific, detailed analyses are more appropriate at the project level. Therefore, the method used to assess noise impacts of the implementation of the Expenditure Plan is to review the list of projects, the change in overall vehicle miles traveled (VMT) and assess the likelihood of significant noise impacts based on the type of project. Subsequent, project-specific environmental assessments would need to further analyze these proposed improvements to determine the magnitude of noise and vibration impacts and potential mitigations for each project.

The analysis in this section is based on the results of the modeling conducted using San Francisco Travel Demand Model (SF-TDM) for the traffic analysis. The SF-TDM is used to project future traffic and transit volumes in San Francisco. This model is consistent with the regional demand and was specifically developed to deal with local conditions including traffic and transit patterns. The traffic modeling included several assumptions, which are discussed in more detail in the transportation section of this EIR (Section 3.2). The noise analysis uses the percentage change in traffic volumes derived from volume to capacity ratios, as an indicator of potential noise impacts.

Summary of Impacts

Implementation of the proposed Expenditure Plan could have three types of noise impacts: short-term impacts during project construction, direct noise impacts resulting from increased speeds and traffic volumes on roadways, and cumulative noise impacts from increased traffic and other noise sources in the county (discussed in Chapter 5 of this EIR).

Short-Term Construction Impacts

The construction of projects proposed under the Expenditure Plan would lead to increased noise levels in areas adjoining these projects. The increased noise would come primarily from the use of heavy equipment during the construction period. Such impacts could include temporary annoyance to nearby residents and workers and violation of local noise ordinance standards.

Long-Term Direct Impacts

Over the long term, certain projects included in the Expenditure Plan would have a high potential to result in increases in noise exceeding the significance criteria established previously. The impacts associated with these facilities would be from direct physical changes brought about by the projects resulting in increased transit and traffic activity, introduction of new noise sources and reduced distances between the noise source and nearby sensitive receptors.

Impacts and Mitigation Measures

Impact 3.9-a ***Construction activities associated with the transportation improvements in the proposed Expenditure Plan would have short-term noise and vibration impacts on adjoining sensitive areas. (Significant, mitigable)***

Almost all the improvements proposed under SFCTA's Expenditure Plan would include construction activities, which could result in a localized increase in ambient noise levels in the areas surrounding those projects. Construction noise would be most significant when it takes place near sensitive land uses, occurs at night, or in early morning hours. These noise impacts will be analyzed in more detail in subsequent project-specific CEQA and NEPA (if applicable) documents. These documents would also recommend mitigation measures to reduce any significant impacts of construction noise to a less than significant level. The level of mitigation would be project and site dependent and would include noise mitigation normally required by Caltrans, as well as requirements under the San Francisco Noise Ordinance. As discussed earlier, the San Francisco Noise Ordinance limits noise from powered construction equipment to 80 dBA at 100 feet. The Noise Ordinance (Section 2908) also prohibits construction work at night from 8:00 p.m. until 7:00 a.m., if noise from such work would exceed the ambient noise level by five dB at the property line, unless a special permit is authorized by the San Francisco Department of Public Works. All construction activities would be subject to these requirements.

Mitigation Measures

N-1 SFCTA shall require that project sponsors comply with CEQA (and NEPA if appropriate) prior to project approval by SFCTA. Project sponsors shall commit to mitigation measures at the time of certification of each environmental document and at the time of project approval to comply with construction noise mitigation normally required City of San Francisco ordinances. Construction mitigation measures generally limit construction activities to times when construction noise would have the least effect on adjacent land uses, and would require such measures as properly muffling equipment noise, and turning off equipment when not in use.

Significance After Mitigation

These mitigation measures would be expected to reduce potentially significant construction-related noise impacts to a less-than-significant level if incorporated by project sponsors. It is not expected that these mitigation measures would eliminate all construction-related noise impacts since complete mitigation may not be possible for certain projects, such as those that require pile driving.

Impact 3.9-b ***Transportation improvements proposed as part of the Expenditure Plan could result in noise levels that approach or exceed the FHWA and FTA Noise Abatement Criteria. (Significant, mitigable)***

A number of transportation improvements in the Expenditure Plan have been identified as having potentially significant local noise impacts, either from vehicle travel or transit. Direct impacts could result from transit service expansions/enhancements and major new roadway capitol projects that increase the speed and volume of traffic on these roadways or bring traffic closer to sensitive receptors. Project level analysis may or may not find significant noise impacts depending upon the project and the existing and projected land use.

Noise mitigation for these new projects may reduce noise in communities that would otherwise continue to experience adverse noise impacts from existing and future traffic had the Expenditure Plan improvements not occurred.

A preliminary analysis at the plan level was conducted using the change in total volume to capacity ratios along key arterial corridors in the city with the implementation of Expenditure Plan projects derived from the transportation screenline analysis. Based on this change, potentially impacted key arterial corridors and key freeways in the city are shown in Tables 3.9-7 and 3.9-8 below.

Table 3.9-7: Projected Traffic Changes Along Key Arterial Corridors in San Francisco

Arterial Corridors	*Projected Increase in Traffic Over Existing Conditions (%)*		
	2025 Base	*Expenditure Plan Only*	*2025 Base + Expenditure Plan*
Geary			
East of Park Presidio	8	16	24
West of Park Presidio	27	16	43
Geary			
East of Masonic	13	-5	8
West of Masonic	12	-6	6
Van Ness			
North of Lombard	8	10	18
South of Lombard	3	8	11
Van Ness			
North of Geary	7	-1	6
South of Geary	6	-1	5
Park Presidio			
North of Geary	2	-4	-2
South of Geary	4	6	9
19th Avenue			

Table 3.9-7: Projected Traffic Changes Along Key Arterial Corridors in San Francisco

Arterial Corridors	*Projected Increase in Traffic Over Existing Conditions (%)*		
	2025 Base	*Expenditure Plan Only*	*2025 Base + Expenditure Plan*
North of Lincoln	9	0	9
South of Lincoln	17	-1	16
19th Avenue			
North of Sloat	6	0	6
South of Sloat	13	0	13
Junipero Serra			
North of County Line	4	1	5
South of County Line	14	1	16
Third Street			
North of Palou	69	8	77
South of Palou	286	14	300
Third Street			
North of 16th	-7	-3	-10
South of 16th	20	3	23
Third Street			
North of Townsend	30	14	44
South of Townsend	39	12	51
Geneva			
East of Ocean	7	0	7
West of Ocean	5	0	5
Geneva			
East of Brookdale	90	20	110
West of Brookdale	-50	6	-44
Mission			
North of Division/14th	27	-5	22
South of Division/14th	7	-2	5
Mission			
North of Cesar Chavez	38	-3	35
South of Cesar Chavez	15	3	19
Mission			
North of Ocean	28	-4	24
South of Ocean	49	-3	46
Market			
Northeast of 5th	20	-20	0
Southwest of 5th	11	0	11
Market			
East of Castro	18	5	23
West of Castro	8	3	11

Source: Transportation Analysis; SFCTA; Environmental Science Associates, 2003.

Table 3.9-8: Projected Traffic Changes Along Key Freeways in San Francisco

Freeways	*Projected Increase in Traffic Over Existing Conditions (%)*		
	2025 Base	*Expenditure Plan Only*	*2025 Base + Expenditure Plan*
U.S. 101			
North of San Mateo County Line	11	-1	10
South of San Mateo County Line	20	-1	19
U.S. 101			
North of Potrero Hill	3	0	3
South of Potrero Hill	3	1	4
U.S. 101			
North of Golden Gate Bridge	12	0	12
South of Golden Gate Bridge	54	0	54
U.S. 101			
North of Francisco	4	0	4
South of Francisco	31	0	31
I-80			
East of Bay Bridge	18	0	18
West of Bay Bridge	33	0	33
I-280			
North of San Mateo County Line	9	0	9
South of San Mateo County Line	10	0	10
I-280			
North of Potrero Hill	10	0	10
South of Potrero Hill	7	-1	6
Central Freeway			
North of Valencia	28	0	28

Source: Transportation Analysis; SFCTA; Environmental Science Associates, 2003.

As shown in Table 3.9-7, the projected increase in traffic over existing conditions along all analyzed arterial roadway segments due to the implementation of the Expenditure Plan alone would range from a reduction of 20 percent to an increase in 20 percent. Also, Table 3.9-8 shows that the Expenditure Plan projects alone would not affect freeway traffic volumes (the change would be +/- 1 percent). A doubling of traffic volume (100 percent increase) would lead to a 3 dBA increase in noise. Since the projected increase in traffic due to the Expenditure Plan alone would be well below 100 percent, the associated noise levels would also be less than 3 dBA (the established significance criteria). However, subsequent project-specific CEQA analysis would reevaluate these impacts in greater detail in addition to analyzing noise from changes in transit activity, which is best done at the project-level.

Mitigation Measure

N-2 SFCTA shall require that project sponsors comply with CEQA (and NEPA if appropriate) prior to project approval by SFCTA. Project sponsors shall commit to mitigation measures at the time of certification of their environmental document. Noise mitigation measures must respond to the land use compatibility criteria included in the San Francisco General Plan (and shown in Table 3.9-5). If federal funding is used for the project, mitigation measures must also conform to applicable FHWA and FTA noise abatement criteria. These commitments obligate project sponsors to implement measures that would minimize or eliminate any significant impacts. Typical mitigation measures that should be considered by project sponsors shall include but not be limited to:

- Adjustments to proposed roadway or transit alignment to reduce noise levels in noise sensitive areas. Depressed roadway alignments are effective at mitigating roadside noise levels.
- Insulation of buildings or construction of noise barriers around sensitive receptors.
- Vibration isolation of track segments.
- Construction of sound walls adjacent to new or modified roads or transit lines, especially when projects are located in the vicinity of sensitive receptors. Noise level increases could, in most cases, be mitigated to levels at or below existing levels if soundwalls were constructed along the rights-of-way. A determination of the specific heights, lengths and feasibility of soundwalls must be part of the project-level environmental assessment.

Significance After Mitigation

Incorporation of the above mitigation measures, based on site-specific impacts, would reduce this potentially significant impact to a less than significant level.

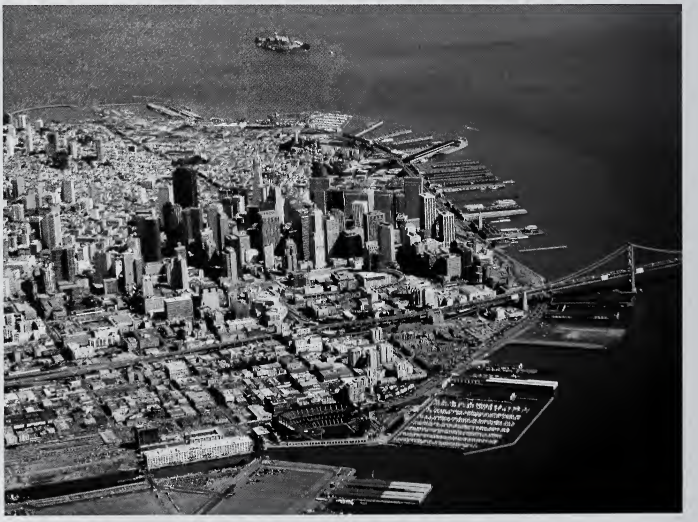
3.10 VISUAL RESOURCES

This chapter describes the existing visual resources of San Francisco and the potential impacts that projects contained in the Expenditure Plan could have on these resources.

3.10.1 SETTING

San Francisco is located at the northernmost tip of a peninsula between the Pacific Ocean and the San Francisco Bay, and contains some of the most recognizable natural and built views in the world. Important views of natural features include the Pacific coastline, San Francisco Bay, Twin Peaks, and the Presidio. Enclosed views, from one area of the city to another, and broader views of the Pacific and the bay can be experienced from ridgelines and hills throughout San Francisco. Cityscape views such as those offered by buildings, unique streets, and distinctive Bay Area bridges are also important visual resources to San Francisco, and the Bay Area region as a whole (see Figure 3.10).

Figure 3.10: Aerial View of Downtown San Francisco



San Francisco's unique visual resources are the product of both its natural beauty and geographical land constraints.

Citywide Visual Resources

The Natural Landscape

The San Francisco landscape is topographically varied, with unique features that characterize the city. The peninsula formed by the coastal range, and its relationship to the Bay itself are prominent physical features of San Francisco. To the north, the tip of the San Francisco peninsula stretches toward the Marin headlands, where the ocean and bay intersect. To the west, the Pacific Ocean and the Coastal Range, extending from the Santa Cruz Mountains up to the mouth of San Francisco Bay dominate the visual setting. The east side of San Francisco tucks between the shoreline of the Bay and the slopes of Rincon and Potrero Hills, while further east, the Bay provides a separation between San Francisco and the facing waterfront of the East Bay: to Oakland, Berkeley and Alameda.

San Francisco contains several distinct ranges and hills. These hills and ridges, which allow the city to be seen, define districts, and more than any other feature produce the variety that is characteristic of San Francisco. The central mass of Twin Peaks separates the city into quadrants, for example, while Telegraph Hill, Sunset Heights and Potrero Hill are neighborhoods. In the topographic form of the city, the valleys and plains are as important as the hills, for they define their own districts and give the hills their visual meaning. Between the Pacific Ocean and San Francisco Bay, the coastal range flattens considerably as hills and numerous valleys undulate across the city. San Francisco Bay is bordered along the west by a heavily urbanized plain that is largely the result of bay infill that occurred gradually over the past hundred years, allowing for direct and largely unobstructed views toward the east.

The Built Landscape

The City of San Francisco is the most important locus of urbanization in the Bay Area. One of its hallmarks is a grid network of streets draped over hills; many can be accessed by cable cars and afford distant views within the city of natural and man-made attractions beyond the San Francisco peninsula itself (Oakland, Mount Diablo, the Marin Headlands). San Francisco is composed of various neighborhoods with very distinct characters woven together in the greater urban context. The well-defined perimeter of San Francisco, bounded by natural features and providing a contrast between the urban intensity and the natural environment, serves to define the city it encloses; it is not surrounded by "sprawl" like many other American cities.

Many built features in San Francisco, such as the Golden Gate and Bay Bridges and the San Francisco skyline in particular, are of international renown. Bay Area residents and tourists alike treasure the variety and quality of the visual experiences that can be found, from heavily traveled freeways, hilltop park vistas, and skyscrapers, to narrow streets and bridges that offer a view. Major transportation projects in San Francisco may affect the visual experiences of travelers and the distinctive visual environment of the city and county.

At 47 square miles, San Francisco is geographically the smallest of the major U.S. cities. A population of 776,733 resides within this area, providing for a relatively high density of inhabitants and workers, especially as compared to other West Coast cities. The business district of the city is a stunning visual resource characterized by tall buildings, the Union Square shopping area, the new Pac Bell Park baseball stadium and the City's Civic Center designed on a visual axis in an effort to be admired from many different vantage points in the city.

San Francisco is fortunate to boast visual resources in most of its neighborhoods, whether it may be the simple continuity of a particular architectural style, the planting of a boulevard's median, or the visual drama of a hilltop vista. Together, the city's natural and urbanized visual resources generate the image and character of the city; to weaken or destroy the visual pattern (grid over hills, architectural themes, street planting patterns, etc.) of the city would make San Francisco a vastly different place. Views that reveal San Francisco's visual pattern also help people to identify districts and neighborhoods, recognize the city's prominent features, and gain a contextual understanding of where one area exists in relation to another.

Parks, Open Space Amenities, and Transportation

San Francisco has made great efforts to reclaim its waterfront. During the 1990s, the Embarcadero Freeway, which impeded movement between many downtown areas and the bay, was torn down. A new light rail line was established running along the waterfront; and a promenade for pedestrian use was inaugurated. These improvements have bettered the continuity of access from downtown to the water, and contribute a significant new visual amenity for the city.

BART and MUNI provide an extensive network of surface level rail, high-speed underground rail, and buses connecting the downtown area to other parts of the city and to points east. In addition, water transport is available via ferries running to the East Bay and Marin to the east and northwest. Taking into account the visual resources that San Francisco offers, the quality of people's visual experience on public transit (i.e., the San Francisco views as seen from a bus, MUNI, etc.) must be considered as well.

Policy and Regulation

Views from the Road

Recognizing the value of scenic areas and the value of views from within the state's network of roadways, the State Legislature established the California Scenic Highway Program in 1963. San Francisco maintains significant roadway arterials necessitated by the volume of people entering and exiting the city each day. The Scenic Highway Program serves to project a favorable San Francisco's image through the window of a car or bus.

A corridor protection program, adopted by the local governments with land use jurisdiction through which the roadway passes, is responsible for moving a road from "eligible" to "designated" status. Each designated corridor is monitored by the State and designation may be revoked if a local government fails to enforce the provisions of the corridor protection program. At a minimum, each corridor protection program must include:

- Regulation of land use and density development;
- Detailed land and site planning;
- Control of outdoor advertising devices;
- Control of earthmoving and landscaping; and
- Regulation of the design and appearance of structures and equipment.

The Master Plan of State Highways Eligible for Official Scenic Highway Designation requires that proposed realignments and route improvements be evaluated for their impact on the scenic qualities of the corridor. San Francisco includes several eligible highways included on the State Master Plan. State Scenic Highways eligible for designation include:

- Highway 1, extending through the western edge of San Francisco; and
- Highway 280, cutting through the center of San Francisco, terminating at the Golden Gate Bridge.

The San Francisco General Plan

San Francisco's visual resources are defended in the City's General Plan by policies outlined in the document's Urban Design Element. Policies call for emphasizing the characteristic development pattern of the city by responding to the topographic quality of the landscape, namely, its hills and valleys. San Francisco's topography is upheld as a civic resource worthy of preservation. As outlined in the General Plan, the city's existing street layout, building form, and the design of open spaces also lend themselves to the San Francisco's valuable view corridors.

The Urban Design Element's Image and Character Policy 1.1, calls for the recognition and protection of major views in the city, with particular attention to those of open space and water. Policy 1.8, calling for increasing the visibility of major destination areas through the implementation of thoughtful planting and development standards, emphasizes San Francisco's awareness of its natural and built assets as a unique visual environment. Policy 3.1 seeks to promote visual harmony in the relationships and transitions between new and older buildings, as a valuable visual asset.

Further visual amenities are outlined in Policies 4.12 through 4.15 such as landscaping, human-scaled interest in the construction of street features, removal of visual clutter, and protection of urban livability from incompatible new buildings (City of San Francisco, 2002).

Policy 2.3 of the Transportation Element of the San Francisco General Plan calls for sensitive design and locating facilities in a manner that preserves the city's historic fabric and natural landscape, and in particular to protect views (City of San Francisco, 2002).

3.10.2 IMPACTS AND MITIGATION MEASURES

Criteria of Significance

The following criteria are used in this EIR to assess whether the proposed Expenditure Plan will have a significant adverse effect on visual resources in San Francisco.

- **Criterion 1:** Blocks panoramic views or views of significant features as seen from the transportation facility.
- **Criterion 2:** Alters the appearance of area near scenic highways.

Generally, the greater the change from existing conditions, the more significant the impact. For example, the construction of a new interchange usually has a greater impact than the modification of an existing one. Likewise, the construction of a new roadway generally has a greater visual impact than the widening of an existing one. Road widenings, however, can have significant local impacts where they would require the removal of trees and other important landscape buffers or where they require the construction of sound walls or other contrasting visual elements.

Methodology and Assumptions

Visual impacts were assessed by comparing the proposed Expenditure Plan transportation network to current conditions and determining whether any of the projects or programs included in the Plan will introduce new visual components to the city's landscape. Expenditure Plan projects that would not involve construction or would not significantly change the configuration of existing transportation facilities were eliminated from consideration, since such projects are unlikely to have a significant visual impact. Projects that will require construction but would not substantially modify existing facilities include the following: seismic upgrades, safety improvements, signalization projects, and street rehabilitation. The remaining projects were reviewed to determine if they were located in or near important visual resources that could significantly change the area's character.

The types of impacts associated with individual projects are identified in this section; however, project-specific impacts cannot be assessed at this time. Site-specific impacts of individual projects will be evaluated in subsequent CEQA environmental review.

Impacts and Mitigation Measures

Short Term Impacts

Some of the transportation improvements in the Expenditure Plan do not consist of permanent structures that would have a significant effect on the visual character of the surrounding area or on views from a facility itself. These projects include freeway and roadway widenings, new freeway interchanges, new rail lines. The construction activities associated with these types of projects may have short-term impacts on visual resources, depending on the location of the project.

Long Term Impacts

The proposed Expenditure Plan includes several transportation projects that could result in potentially significant long-term visual impacts. These projects include the construction of a new Transbay Terminal, as well as the Third Street Light Rail extension, which will require the undergrounding at the Central Subway portion of the project. Views to city landmarks and view corridors may be affected by the construction of these projects.

Implementation of the proposed Expenditure Plan would introduce new elements to the built environment that could change the visual character of some areas of San Francisco. In addition, other transportation projects outlined in the plan not identified as having a direct visual impact in San Francisco's citywide context may result in individually minor visual impacts locally. Collectively, these individually minor visual impacts may become significant over time.

Impact 3.10-a: Construction of new transportation projects supported by the Expenditure Plan has the potential to adversely affect visual resources in San Francisco during period of construction. (Significant, mitigable)

The construction of proposed transportation projects included in the Expenditure Plan could result in short-term visual impacts from the blockage of views by construction equipment and scaffolding, the removal of landscaping, temporary route changes, temporary signage, exposed excavation and slope faces, and construction staging areas.

The majority of projects and programs in the proposed Expenditure Plan will not result in significant impacts, as they involve efforts that revolve around MUNI route improvements, road maintenance and pedestrian and bicycle-centered projects. However, several major capital projects, such as the Central Subway, the extension of Caltrain to a rebuilt Transbay Terminal, and the reconstruction of Doyle Drive, have the potential to result in significant visual impacts during construction, and perhaps after if view corridors in the project's immediate vicinity are impaired.1

Scenic highways in San Francisco are not likely to be effected by projects that are part of the proposed Expenditure Plan.

Mitigation Measures

V-1: SFCTA shall require project proponents to undertake project-level analyses as appropriate for proposed new transportation improvements, and require project proponents to comply with applicable federal, State, and local regulations. As appropriate to the environmental review of specific projects, project sponsors shall incorporate the following measures:

- Minimize the visibility of construction staging areas where possible; use fencing and screening materials that are low contrast, consistent with the surrounding landscape.

---

[1] These projects have completed or are undergoing environmental analysis under separate EIRs.

- Revegetate graded slopes and exposed earth surfaces at the earliest opportunity.

Significance After Mitigation

With the above mitigation measures, the impact after mitigation would be expected to reduce potentially significant impacts on visual resources to a less-than-significant level if incorporated by project sponsors. While these mitigation measures would effectively reduce negative visual impacts, it is not expected that all visual impacts would be eliminated.

Impact 3.10-b: Once built, certain transportation projects supported by the Expenditure Plan have the potential to adversely affect visual resources in San Francisco over the long term. (Significant, mitigable)

Certain major capital projects included in the proposed Expenditure Plan could result in long-term changes to the built environment and possibly create adverse visual impacts. The blockage of views by new structures and plantings, grade changes and new maintenance facilities may result in areas immediately adjacent to a project site. Three of the four major capital projects proposed in the Expenditure Plan (the new Central Subway, the Caltrain Extension to the Transbay Terminal and the Doyle Drive Replacement) involve new structural elements and may generate altered view corridors from the perspective of nearby buildings, streets, and open spaces. The Doyle Drive project has the potential for altering appearance of an area near a scenic highway, although several proposed designs for the facility would serve to enhance vistas in the project area.

Mitigation Measure

V-2: SFCTA shall require project proponents to undertake project-level analyses as appropriate for proposed new transportation improvements, and require project proponents to comply with applicable federal, State, and local regulations. As appropriate to the environmental review of specific projects, project sponsors shall incorporate the following measures

- Analyze and incorporate considerations of blockage of panoramic views and views of significant features
- Minimize alteration of appearance of area near a scenic highway.

Significance After Mitigation

This mitigation measure would be expected to reduce potentially significant long term impacts on visual resources to a less-than-significant level. It is not expected that these mitigation measures would eliminate all visual impacts; however, the incorporation of a design review process and view and scenic considerations would be likely to result in visual changes that are not considered significantly adverse by viewers.

3.11 WATER RESOURCES

This section discusses water resources associated with the City and County of San Francisco and the proposed Expenditure Plan. Existing water bodies, drainage patterns, groundwater basins, stormwater and sewer systems, and applicable plans, policies, and regulations are described. Finally, the potential for the proposed sales tax measure and Expenditure Plan to adversely affect water quality through sedimentation or increased pollutant loads, alter existing drainage patterns, increase stormwater runoff rates potentially resulting in flooding, or decrease groundwater recharge rates is assessed.

3.11.1 SETTING

Regional Setting

Climate

Much of California enjoys a Mediterranean climate with cool, wet winters and warm, dry summers. Most of the Bay Area's moisture originates in the Pacific Ocean as high pressure shifts southward in the winter. The warm valley brings moisture from the ocean in the form of cooling fog to San Francisco in the summer. Climate within the Bay Area varies significantly depending on topographic conditions and proximity to the ocean. The coastal areas have mild, rainy winters and mild, foggy summers, while the inland areas experience more extreme variation between winter low and summer high temperatures. Approximately 95 percent of the annual precipitation occurs between October and April. Flooding can occur in urban creeks and streams during more intense rainstorms. Annual rainfall can range from eight to nine inches per year in the inland valleys and from 22 to 24 inches in the coastal hills and northern reaches of the region.

Surface Waters and Groundwater

Surface waters in the Bay Area include fresh water rivers and streams, coastal waters, and estuarine waters. Estuarine waters are comprised of the San Francisco Bay-Delta extending from the Golden Gate to the Sacramento and San Joaquin Rivers, and lower reaches of assorted streams that flow directly into the Bay. The San Francisco Bay estuary includes deepwater channels, tidelands, and marshlands that provide a variety of habitats for plants and animals, including humans. The salinity of the water varies widely as the landward flows of saline water and the seaward flow of fresh water often converge. The salinity levels in the Central Bay can vary from near oceanic levels to one-quarter saline, depending upon the volume of freshwater runoff.

Groundwater basins in the region are closely linked to local surface waters, and as water flows from regional mountain ranges toward the Bay it percolates downward through permeable soils and alluvial deposits. Regionally, groundwater resources provide a large source of drinking water for Bay Area communities.

San Francisco Setting

Climate

Temperatures in the San Francisco area average 58 degrees Fahrenheit annually, ranging from the mid-40s on winter mornings to the mid-70s in late summer afternoons. The strong onshore flow of summer wind keeps cool air and associated fog and clouds over the city until September when the offshore Pacific high-pressure center weakens and migrates southward. San Francisco's warmest temperatures therefore generally occur in September and October. Temperature extremes, reaching 90 degrees or dropping to freezing, are rare in San Francisco. Rainfall in San Francisco averages 18 to 20 inches per year and is confined primarily to the "wet" season from late October to early May. Except for occasional light drizzles from thick marine stratus clouds, summers are almost completely dry.

Surface Water

Historically, the City contained numerous streams and creeks that provided natural drainage channels from hills and valleys of the City to the Bay or Pacific Ocean. Development within the City resulted in all of the creeks and streambeds, with the exception of Lobos Creek, to be filled or paved. Essentially all surface drainage in the City has therefore been channelized through a combined stormwater/sewage system. The two major remaining surface water bodies associated with groundwater recharge are Lake Merced and Lobos Creek. Both Lake Merced and Lobos Creek have been identified as either existing or potential drinking water sources. Mountain Lake is also hydrologically connected to the groundwater system, and historically served as a drinking water source

Groundwater

The City of San Francisco has seven underlying groundwater basins: the Westside, Downtown, Lobos, Marina, Islais Valley, South, and Visitacion Valley. The Downtown, Lobos, Marina, and South basins are located entirely within San Francisco. Both Lobos Creek and Mountain Lake lie within the Lobos groundwater basin. The Westside, Islais Valley and Visitacion Valley basins are located in both San Francisco and San Mateo County. The Westside basin incorporates Lake Merced and extends further south along the east side of the peninsula to South San Francisco Bay, and is hydraulically connected to a larger, regional groundwater system.

The quantity, movement and quality of groundwater within these basins are influenced by many factors. The balance of discharge and recharge determines quantity. Discharge occurs in several ways, including lateral movement of groundwater to seeps, springs, lakes, the ocean or bay and also groundwater pumping. Recharge in urban areas such as San Francisco is affected by the extent of impervious surfaces such as asphalt and concrete, which inhibit the natural recharge of groundwater. Recharge is also influenced by other factors, including climate, land use, water use, irrigation, underground pipe leakage, rainfall runoff, and evapotranspiration. In addition to the vast extent of impervious surfaces within the City, recharge of San Francisco's groundwater basins is also hindered by the historic channelization of nearly all surface water drainages into the combined stormwater/sewage system.

Drinking Water Supply

San Francisco's drinking water supply comes from three major sources: Hetch Hetchy Reservoir, reservoirs and groundwater in Alameda and Contra Costa County, and reservoirs in San Mateo County.

Hetch Hetchy Reservoir, located in Yosemite National Park in the Sierra Nevada Mountains, provides approximately 85 percent of San Francisco's total water needs. Spring snowmelt flows down the Tuolumne River and fills Hetch Hetchy, the largest reservoir in the San Francisco Public Utilities Commission (SFPUC) system. Water stored in Hetch Hetchy is transferred via pipeline to reservoirs in San Mateo County.

Together the Alameda and Peninsula watersheds produce about 15 percent of the total SFPUC water supply. Six reservoirs capture rainfall and runoff from nearby hills. The Alameda watershed, located in Alameda and Santa Clara Counties, contributes surface water supplies captured and stored in two reservoirs, Calaveras and San Antonio. The Sunol Filter Galleries near the Town of Sunol are groundwater sources supplying less than one percent of San Francisco's water. The Peninsula watershed in San Mateo County contributes surface water supplies captured and stored in lower and upper Crystal Springs and San Andreas Reservoirs and in two smaller reservoirs, Pilarcitos and Stone Dam (SFPUC website, 2003).

In addition to these existing water supplies, groundwater basins located within San Francisco have the potential to be developed into potable water supplies. The Westside basin is the largest of the seven basins in the City and County. Lake Merced is located within this basin and is a natural freshwater lake located in the southwestern corner of San Francisco. In this basin, existing wells produce high-quality water and it is therefore considered a potential potable water supply. The Lobos basin incorporates Lobos Creek and Mountain Lake. Groundwater in the basin is generally of good quality, although there are several sites within the basin where release of hazardous materials may result in the need for treatment to raise water quality to potable water standards. Other groundwater basins in San Francisco are not likely to yield a water supply that would meet potable water standards due to historic and ongoing hazardous materials use, which have impacted groundwater quality.

Water Quality and Wastewater Treatment

Municipal wastewater typically contains high concentrations of organic matter that will decompose, and inorganic particulates, nutrients, and pathogenic microorganisms. It also contains oil and grease, and small quantities of metals, pesticides, solvents, and plasticizers. Wastewater treatment greatly reduces the concentrations of most substances, however dissolved metals and organic substances that are resistant to breakdown by bacteria may pass through treatment relatively unaltered.

Pollutants contained in urban runoff include street litter, sediment, oil and grease, oxygen-demanding substances, pathogenic microorganisms, metals, and pesticides. Generally the concentrations of oxygen-demanding substances, nutrients, and pathogenic microorganisms are much lower than in untreated municipal wastewater.

Water Pollutants enter San Francisco Bay from various sources, including municipal and industrial effluent, urban runoff, non-urban runoff, surface water tributaries, dredging and disposal of dredged material, atmospheric deposition, spills, and marine vessel discharge; mixing of these inputs occurs through semi-diurnal (twice daily) tides. During each complete ebb-flood cycle in the Bay, 10 to 30 percent or more of Bay water is replaced with new ocean water. During dry weather each complete tidal cycle replaces about 24 percent of the volume of the Bay with new water. During wet weather, freshwater inflow from the Sacramento-San Joaquin Delta can increase the tidal exchange ratio to over 80 percent. The California State Water Resources Control Board (SWRCB) and San Francisco Bay Regional Water Quality Control Board (RWQCB) have listed central San Francisco Bay as an impaired waterbody on the basis of field surveys of the water column, sediments, sediment toxicity, bivalve bioaccumulation, and water toxicity. This determination is relative to levels of mercury, copper, selenium, diazinon, and polychlorinated biphenyls.

The RWQCB's San Francisco Bay Basin Water Quality Control Plan (Basin Plan) lists beneficial uses along the Bay Shoreline as including navigation, non-contact water recreation and fishing; water-contact recreation occurs on the north shore near Crissy Field and Aquatic Park and on the southeast shore at Candlestick Point. Beneficial uses can sometimes be affected by San Francisco's near-shore discharges of treated combined sewer overflows (CSOs), described below. More than 20 shoreline overflow structures are located throughout the city and discharge treated CSOs directly into the Bay or ocean. As part of the City's requirements for its wet-weather facilities, the City conducts year-round monitoring, three times a week, including standard operations (presence of foam, floating materials, odors or other evidence of pollutants) and tests for total coliform bacteria. The coliform test data are used as an indicator of bacteriological water quality for public health protection at beaches with water-contact recreation.

Sewer System

San Francisco operates a combined sewer system that collects sanitary sewage and stormwater in the same pipes. The topography of the City naturally divides the system into two watershed areas: the Oceanside and the Bayside. Combined sewage produced in the Oceanside watershed is collected and treated at the Oceanside Water Pollution Control Plant, located on the west side of the City near the San Francisco Zoo. Bayside combined sewage is collected and treated at the Southeast Water Pollution Control Plant, located in the southeast part of the City near Islais Creek. An additional Bayside wet-weather facility is the North Point Water Pollution Control Plant on Bay Street. This Plant provides treatment for the northeast quadrant of the City and only operates during wet-weather. The City's combined sewer system is largely operated by the force of gravity.

If the City's treatment plant capacity is reached, excess combined flows are stored for later treatment. If a rainstorm is large enough that the capacity of the storage/transport facilities is exceeded, discharge of treated CSOs occurs at outfalls along the City's shoreline. When combined sewage is temporarily stored, floating materials are removed from the water surface and some solids settle to the bottom of the structures. The accumulated solids are then flushed to treatment plants after the storm has subsided. This removal of floating materials and some solids during temporary storage is approximately equivalent to primary treatment.

The water quality of the effluent discharged into the Bay by the Southeast Plant and the North Point Plant is regulated by two individual National Pollutant Discharge Elimination System (NPDES) permits issued by the RWQCB. Both permits set forth discharge prohibitions, effluent concentration limitations, receiving water limitations, and related operational requirements. Limitations are based on the operating conditions at the treatment plants, and relevant policies, water quality objectives, and criteria of the RWQCB Basin Plan. The permits also specify the maximum flow to be processed at each treatment plant. One NPDES permit regulates all dry-weather and wet-weather discharges from the Southeast Plant, and the second permit regulates the quality of discharges from the Bayside wet-weather facilities, including North Point.

Flooding

San Francisco is not subject to flooding of natural waterways. The National Flood Insurance Program, which designates flood-prone areas, has identified no areas in San Francisco. Flooding within the City from dam or reservoir failure is most likely to occur as a result of an earthquake. Potential inundation areas associated with the reservoirs and above ground water tanks that are owned and operated by the San Francisco Water Department are shown on Figure 3.11-1. The San Francisco Water Department monitors these facilities, some of which are regulated by the California Department of Water, Division of Dam Safety (DSOD) (City of San Francisco, 1996).

Regulatory Framework

There is a well established regulatory framework of state and federal laws for the protection of water resources. These regulations establish criteria for the protection of human health and the environment, including stormwater discharges to surface water. These regulations are discussed below.

Water Quality

The federal Clean Water Act of 1972 requires the US Environmental Protection Agency (USEPA) to develop, publish, and periodically update ambient water quality criteria for the protection of human health. In 1980, the USEPA published water quality criteria for 64 pollutants and pollutant classes and considered non-cancer, cancer, and taste and odor effects, and additional criteria were adopted under the 1992 National Toxics Rule (USEPA, 2000a). In 2002, the USEPA revised its recommended water quality criteria for 83 chemicals based on a revised methodology adopted in 2000; additional revisions are planned.

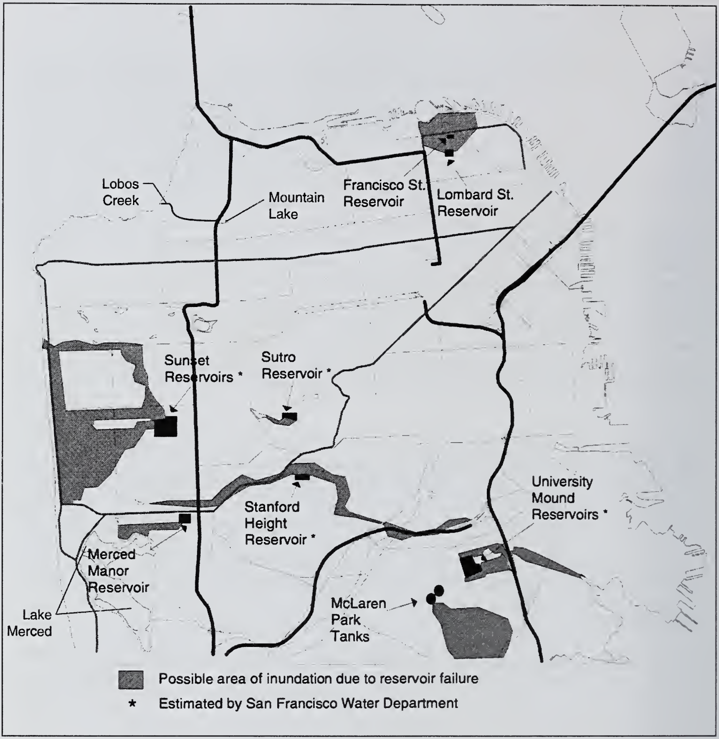

Lobos Creek
Mountain Lake
Francisco St. Reservoir
Lombard St. Reservoir
Sunset Reservoirs *
Sutro Reservoir *
University Mound Reservoirs *
Stanford Height Reservoir *
Merced Manor Reservoir
Lake Merced
McLaren Park Tanks
▨ Possible area of inundation due to reservoir failure
* Estimated by San Francisco Water Department

Figure 3.11: San Francisco Water Bodies and Areas of Inundation due to Reservoir Failure

SOURCE: URS/John Blume and Associates, 1974.

These criteria are used by states for establishing water quality standards under Section 303 (c) of the Clean Water Act and ultimately providing a basis for controlling discharges or releases of pollutants.

The Porter-Cologne Water Quality Control Act (Division 7 of the California Water Code) regulates water quality within California and established the authority of the State Water Resources Control Board and the nine Regional Water Quality Control Boards. San Francisco Bay waters are under the jurisdiction of the San Francisco Bay Region RWQCB. The RWQCB established regulatory standards and objectives for water quality in the bay in the Water Quality Control Plan for the San Francisco Bay Basin, commonly referred to as the "Basin Plan", as previously discussed (San Francisco Bay RWQCB, 1995). The Basin Plan identifies existing and potential beneficial uses and provides numerical and narrative water quality objectives designed to protect those uses.

The following existing beneficial uses are identified for San Francisco Bay, Central portion: commercial and sport fishing; estuarine habitat; industrial service supply; industrial process supply; fish migration; navigation; preservation of rare and endangered species; water contact recreation; non-contact water recreation; shellfish harvesting; fish spawning; and wildlife habitat.

The RWQCB has listed all segments of San Francisco Bay as an impaired water body, as required under Section 303 (d) of the Clean Water Act. Impaired waters are defined as those that do not meet water quality standards, even after point sources of pollution have implemented pollution control technology. The Clean Water Act requires the development of action plans, known as Total Maximum Daily Loads (TMDL), to improve water quality in water bodies designated as impaired.

The TMDL is a calculation of the total amount of a pollutant that a water body can receive and still meet water quality objectives for a pollutant identified as causing impairment. The TMDL report allocates permissible quantities for discharge from specific sources. The pollutants that have been identified as causing impairment in San Francisco Bay in the project vicinity include mercury, selenium, exotic species, polychlorinated biphenyls, copper, nickel, and pesticides (USEPA, 2003). Reports for these compounds are scheduled for completion between 2003 and 2010 and later. The TMDL reports and associated implementation plans include considerations for future amendments to the Basin Plan to adopt the TMDL and all its related parts.

NPDES Waste Discharge Regulations

The federal Clean Water Act and subsequent amendments, under the enforcement authority of the USEPA, also established the National Pollutant Discharge Elimination System (NPDES) program to protect water quality of receiving waters. Under the Clean Water Act, discharge of pollutants to receiving waters is prohibited unless the discharge is in compliance with an NPDES permit. Discharge of municipal and industrial wastewater as well as stormwater runoff is regulated under NPDES permit requirements. The NPDES permit specifies discharge prohibitions, effluent limitations and other provisions (such as monitoring programs) deemed necessary to protect water quality. In California, the USEPA has delegated the implementation and enforcement of the NPDES program to the State Water Resources Control Board and the California Regional Water Quality Control Boards. The RWQCB considers the beneficial uses of receiving water in establishing NPDES permit requirements in the San Francisco Bay region.

Southeast and Bayside Facilities NPDES Permit

The City currently holds an NPDES permit adopted by the RWQCB in June 2002 that covers the Southeast Water Pollution Control Plant, the North Point Wet Weather Facilities, and all of the Bayside wet weather facilities, including discharges from the CSOs to the Bay. The permit specifies discharge prohibitions, dry weather effluent limitations, wet weather effluent performance criteria, receiving water limitations, sludge management practices, and monitoring and reporting requirements. The permit prohibits overflows from the CSO structures during dry weather, and wet weather overflows are required to comply with the nine minimum controls specified in the federal Combined Sewer Overflow Control Policy. These controls include regular operations and maintenance programs for the CSO structures; measures to control solid and floatable materials discharged from the CSOs; develop and implement pollution prevention program; public notification of overflows on public beaches; and monitoring of CSOs to characterize overflow impacts and the efficacy of CSO controls (San Francisco Bay RWQCB, 2002).

Municipal Stormwater NPDES Permit

Between 1972 and 1990, NPDES regulations focused on municipal and industrial wastewater discharges. In 1990, NPDES additional stormwater discharge regulations became effective. The 1990 Phase 1 stormwater regulation required NPDES permits for stormwater runoff from industrial sites, large construction sites (five acres or more), and large municipal separate storm sewer systems. San Francisco was not subject to the Phase 1 requirements because of its combined sewer system, although certain areas within the Port of San Francisco were subject to and complied with permit requirements for industrial sites. In 1999, the Phase 2 stormwater regulations required NPDES permits for stormwater runoff from smaller construction sites (one acre or more) and smaller municipal separate storm sewer systems by 2003. The City of San Francisco and specific areas within the Port of San Francisco not served by the combined sewer system are subject to the Phase 2 stormwater permit requirements.

The City has applied for coverage under the State Water Resources Control Board NPDES General Permit for stormwater discharges from small municipal separate storm sewer systems (California SWRCB, 2003), which became effective in March 2003. In compliance with requirements under the General Permit, the San Francisco Public Utilities Commission and the Port have jointly prepared an Initial Storm Water Management Program (SWMP), which describes the stormwater management plans and implementation measures for 2003 through 2004. The SWMP would address six minimum control measures required under the Phase 2 stormwater regulations: (1) public education, (2) public involvement/participation, (3) illicit discharge detection and elimination, (4) construction site stormwater runoff control, (5) post construction stormwater management in new development and redevelopment, and (6) pollution prevention/

good housekeeping for municipal operations. The SWMP is designed to reduce the discharge of pollutants from the City's municipal separate storm sewer system to the maximum extent practicable and to protect water quality (SFPUC and Port of SF, 2003).

Industrial Storm Water NPDES Permit

The federal Clean Water Act includes regulations requiring that stormwater associated with industrial activity that discharges either directly to surface waters or indirectly through municipal separate storm sewers must be regulated by an NPDES permit (California SWRCB, 1997). Industrial sites within the Port of San Francisco are currently covered by and in compliance with the State General Permit for Industrial Storm Water discharges.

Construction Stormwater NPDES Permit

The federal Clean Water Act effectively prohibits discharges of stormwater from construction projects unless the discharge is in compliance with an NPDES permit. The State Water Resources Control Board is the permitting authority in California and has adopted a statewide General Permit for Storm Water Discharges Associated with Construction Activity that encompasses one or more acres of soil disturbance; the current 1999 General Permit updates the previous 1992 General Permit. A draft 2003 General Permit has been issued to incorporate requirements of the Phase 2 stormwater regulations, and under this permit, the operators of construction activities can obtain a waiver from permitting requirements if there is low predicted rainfall potential (USEPA, 2000b).

The NPDES Storm Water Program requires operators of both large and small construction sites to obtain authorization to discharge stormwater under an NPDES construction stormwater permit. Construction activity resulting in a land disturbance of one acre or more, or less than one acre but part of a larger common plan of development or sale must obtain the Construction Activities Storm Water General Permit (General Permit). Construction activity includes clearing, grading, excavation, stockpiling, and reconstruction of existing facilities involving removal and replacement. In general, the NPDES stormwater permitting requirements for construction activities require that the landowner and/or contractor develop and implement a Storm Water Pollution Prevention Plan (SWPPP) and submit required notices. The SWPPP must specify Best Management Practices (BMPs) that will prevent construction pollutants from contacting stormwater, with the intent of keeping products of erosion from moving off site into receiving waters. The SWPPP must include measures for erosion and sediment controls, methods for construction waste handling and disposal, and post-construction erosion and sediment control requirements. The SWPPP also addresses elimination or reduction of non-stormwater discharges to receiving waters and inspection of all BMPs.

Nonpoint Source Pollution

The Coastal Zone Management Act (CZMA) of 1972, as amended, sets forth the national policy that State coastal management programs should provide for public access to the coasts for recreational purposes. While boating and associated activities, such as marinas, are an important means of public access, they may also pose a threat to the health of aquatic systems if poorly planned or managed. In 1990, Congress passed the Coastal Zone Act Reauthorization Amendments (CZARA) to address nonpoint source pollution problems in coastal waters. Section 6217 of CZARA and Section 319 of the Clean Water Act require California and 28 other states to develop Coastal Nonpoint Source Pollution Control programs, incorporating required management measures to reduce or prevent polluted runoff to coastal waters from specific sources.

California's Nonpoint Source Pollution Control Program plan was developed by the SWRCB and California Coastal Commission (CCC), in cooperation with the nine Regional Water Quality Control Boards, to conform to the requirements of CZARA and the Clean Water Act (California SWRCB and CCC, 2000). The plan is intended to protect the State's water quality by expanding its polluted runoff control efforts. It specifies 60 management measures to prevent or reduce water quality degradation from agriculture, forestry, urban areas, marinas and boating, hydromodification, and wetlands. The plan was fully approved by the USEPA and National Oceanic and Atmospheric Administration in July 2002. Implementation of the approved program is required by 2004 and implementation of additional measures by 2009, if the proposed water quality management measures are demonstrated not to provide sufficient protection of water quality.

Through a memorandum of understanding (MOU) with the SWRCB and RWQCB, the Bay Conservation and Development Commission (BCDC) is the implementing agency for the following categories of nonpoint source pollution (1) urban; (2) marinas and recreational boating; (3) hydromodification; and (4) wetlands and riparian areas. The BCDC Nonpoint Source Pollution Report and Proposed Work Program (SFBCDC, 2001) addresses polluted runoff from these sources, describes BCDC's current polluted runoff control permit conditions, and describes applicable management measures. This report also considers improvements needed to be consistent with the California Plan and the federal requirements of the Coastal Zone Management Act.

In accordance with the MOU and the Nonpoint Source Pollution Report and Work Program, the BCDC would incorporate compliance with management measures applicable to a nonpoint pollutant source under their jurisdiction as part of their special permit conditions and may include additional requirements for the protection of water quality.

The RWQCBs also coordinate the State Water Quality Certification Program, or Section 401 of the CWA. Under Section 401, states have the authority to review any permit or license that will result in a discharge or disruption to wetlands and other waters under state jurisdiction, to ensure that the actions will be consistent with the state's water quality requirements. This program is most often associated with Section 404 of the CWA, which obligates the U. S. Army Corps of Engineers to issue permits for the movement of dredge and fill material into and from the "waters of the United States." Additionally, Section 404 requires permits for activities affecting wetlands. Prospective alterations of hydrologic features such as wetlands, rivers, and ephemeral creek beds resulting from construction require Section 404 permits.

Flood Hazard

The U.S. Congress passed the National Flood Insurance Act in 1968 and the Flood Disaster Protection Act in 1973 in order to restrict certain types of development on floodplains and provide for a national flood insurance program. The purpose of these programs is to reduce the need for large publicly funded flood control structures and disaster relief.

The Federal Emergency Management Agency (FEMA) administers the National Flood Insurance Program. The program provides subsidized flood insurance to communities that comply with FEMA regulations to limit development in floodplains. FEMA issues Flood Insurance Rate Maps, which classify flood zones, for communities participating in the National Flood Insurance Program.

Many local jurisdictions regulate development within flood plains. Construction standards are established within local ordinances and planning elements to reduce flood impedance, safety risks and property damage. Historic flooding in the San Francisco Bay region has also led local flood control agencies and the U. S. Army Corps of Engineers to establish extensive flood control projects including dams and improved channels. San Francisco does not contain any FEMA designated flood zones, and the only remaining natural surface water drainage is Lobos Creek. Therefore, neither flood zone specific construction standards nor flood control projects exist within San Francisco.

3.11.2 IMPACTS ANALYSIS

Criteria of Significance

This EIR uses the following criteria to assess whether the proposed Expenditure Plan would have a significant adverse effect on water resources:

- **Criterion 1:** Erosion from cut-and-fill slopes that would contribute to sediment loads of stream and drainage facilities and affect water quality.
- **Criterion 2:** Substantial pollution of stormwater runoff from litter, fallout from airborne particulate emissions, or discharges of vehicle residues, including petroleum hydrocarbons, oil, grease, and metals that would impact the quality of receiving waters.
- **Criterion 3:** Pollution of stormwater runoff from construction sites due to discharges of sediment, chemicals, and wastes to nearby storm drains and creeks.
- **Criterion 4:** Increased rates and amounts of runoff due to additional impervious surfaces or alterations to drainage systems that could cause potential flood hazards and effects on water quality.
- **Criterion 5:** Alteration of the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, which would result in flooding on- or off-site.

- **Criterion 6:** Reduced rates of groundwater recharge due to the increased amount of impervious surfaces.

Method of Analysis

Impacts are determined for the proposed Expenditure Plan as a whole and for projects involving new construction. The Proposed Expenditure Plan Projects map (Figure 2-2) has been compared to general water resources. This map provides broad information for identifying areas of potential water resource contamination or alteration. Potential effects on water resources would vary depending on the type and scale of the project, the location of the project relative to drainage facilities and water bodies, and the sensitivity of the receiving facility or water body; San Francisco Bay is listed as an impaired body of water. Due to the programmatic nature of this EIR, this analysis should be used in the most general sense; this analysis does not satisfy the need for site-specific surveys for individual projects.

Impacts and Mitigation Measures

Impact 3.11-a: Construction activities could result in erosion and cause subsequent sedimentation of stormwater runoff, or introduce pollutants to runoff from the use of hazardous materials. (Significant, mitigable)

Bare slopes of construction sites can be a major source of surface runoff pollution. Erosion associated with excavation or grading operations could adversely impact water quality in stormwater runoff generated within construction sites and receiving water bodies. The resulting water quality problems include sediment build-up and blockage of drainageways and/or channels, turbidity, increased algae growth and oxygen depletion. Excessive deposition of sediments in stream channels can blanket fauna and reduce photosynthesis thereby degrading aquatic habitat. The amount of sediment reaching storm drains and creeks is likely to increase and could alter drainage patterns, though it would not be expected to result in flooding on or off site. In addition, an increase in stormwater runoff pollutants such as gasoline additives, oil and grease, and heavy metals from construction sites as a result of vehicle and equipment fueling and maintenance during construction, and the storage and use of hazardous materials such as petroleum products could occur. These are considered short-term significant mitigable impacts.

Mitigation Measure

W-1 SFCTA shall require project proponents to obtain an NPDES permit from the RWQCB for construction projects that incorporate over one acre, as required by the SWRQC. Under NPDES permit regulations, the project proponent would be required to prepare and implement a Storm Water Pollution Prevention Plan (SWPPP). The SWPPP be consistent with the State Construction Storm Water General Permit, the Manual of Standards for Erosion and Sedimentation Control by the Association of Bay Area Governments, policies and recommendations of the local urban runoff program (city and/or county), and the recommendations of the RWQCB. Implementation of the SWPPP shall be enforced by inspecting agencies during the construction period.

Typical elements of a SWPPP include:

- Excavation and grading activities will be scheduled for the dry season only (April 15 to October 15), to the extent possible. This will reduce the chance of severe erosion from intense rainfall and surface runoff, as well as the potential for soil saturation in swale areas.
- If excavation occurs during the rainy season, storm runoff from the construction area will be regulated through a stormwater management/erosion control plan that may include temporary onsite silt traps and/or basins with multiple discharge points to natural drainages and energy dissipaters. Stockpiles of loose material will be covered and runoff diverted away from exposed soil material. If work is stopped due to rain, a positive grading away from slopes will be provided to carry the surface runoff to areas where flow can be controlled, such as the temporary silt basins. Sediment basin/traps will be located and operated to minimize the amount of offsite sediment transport. Any trapped sediment will be removed from the basin or trap and placed at a suitable location onsite, away from concentrated flows, or removed to an approved disposal site.
- Temporary erosion control measures will be provided until perennial revegetation or landscaping is established and can minimize discharge of sediment into nearby waterways. For construction within 500 feet of a water body, straw bales will be placed upstream adjacent to the water body.
- After completion of grading, erosion protection will be provided on all cut-and-fill slopes. Revegetation will be facilitated by mulching, hydroseeding, or other methods and should be initiated as soon as possible after completion of grading and prior to the onset of the rainy season (by November 1).
- Permanent revegetation/landscaping will emphasize drought-tolerant perennial ground coverings, shrubs, and trees to improve the probability of slope and soil stabilization without adverse impacts to slope stability due to irrigation infiltration and long-term root development.
- BMPs selected and implemented for the project will be in place and operational prior to the onset of major earthwork on the site. The construction phase facilities will be maintained regularly and cleared of accumulated sediment as necessary.
- Hazardous materials such as fuels and solvents used on the construction sites will be stored in covered containers and protected from rainfall, runoff, and vandalism. A stockpile of spill cleanup materials will be readily available at all construction sites. Employees will be trained in spill prevention and cleanup, and individuals will be designated as responsible for prevention and cleanup activities.

Significance After Mitigation

This mitigation measure would reduce potentially significant impacts associated with construction-related adverse impacts on water quality to a less-than-significant level.

Impact 3.11-b: Construction activities may discharge groundwater impacted with hazardous materials during dewatering. (Significant, mitigable)

The proposed project would involve excavation activities associated with construction of tunnels and other subsurface improvements that may extend below the groundwater table. These excavation activities may occur in areas where historic or current use of hazardous materials has resulted in impacts to underlying groundwater bodies. Dewatering of excavations may therefore result in discharge of contaminated groundwater to local water bodies or San Francisco's stormwater/sewer system. This would be a significant mitigable impact.

Mitigation Measure

W-2 SFCTA shall require project proponent to undertake project-level analyses as appropriate for proposed new transportation improvements, and take appropriate steps relating to groundwater discharge where excavation activities are involved, to reduce any potential impacts to a less-than-significant level. The project proponent shall obtain a discharge permit from the City of San Francisco's Public Works Department prior to discharge of groundwater generated by excavation dewatering activities to San Francisco's stormwater/sewer system. For projects located in areas where dewatering activities would require the discharge of groundwater generated by construction to a local water body, the project proponent shall obtain a permit from the RWQCB.

Significance After Mitigation

This mitigation measure would reduce potentially significant impacts associated with groundwater discharge to a less-than-significant level.

Impact 3.11-c: Construction activities would increase impervious surface areas causing an increase in stormwater runoff volume, rate, and nonpoint-source pollutant levels. (Significant, mitigable)

The proposed project would result in a minor increase in impervious surfaces within the San Francisco region associated with paving activities. The creation of new impervious surfaces associated with the proposed projects is expected to be relatively minor, as most projects are located in areas that have already been paved. The only project associated with construction of a new roadway is the replacement of Doyle Drive. However, removal of the old Doyle Drive would likely partially off-set the increased impervious surface area associated with replacement activities; the potential for this impact is being evaluated in the Doyle Drive EIR/EIS.

Adding impervious surfaces would generate more runoff and increase the potential for that runoff to carry pollutants to major water bodies, while also reducing the amount of surface water that can filter into the ground and recharge groundwater basins. Stormwater runoff from impervious surfaces can generate nonpoint-source pollutants such as organic materials that increase the biological oxygen demand (the demand for oxygen in the water needed by aquatic life to survive), suspended solids, pathogens, sediment from erosion, air pollution fallout, nitrogen and phosphorus from chemical fertilizers, animal wastes, leachates from leaves, and pesticides. An increase in stormwater runoff and nonpoint-source pollutants would be a significant mitigable impact.

Mitigation Measures

The following mitigation measures shall be included in project-level analyses as appropriate for proposed new transportation improvements.

W-3 The project proponent shall be required to meet the provisions of the federal Clean Water Act by submitting plans to eliminate and control potential pollutants in storm water discharge through incorporation of structural and treatment BMPs.

W-4 Projects shall be designed to allow lateral transmission of stormwater flows across transportation corridors with no increased risk of upstream flooding. Culverts and bridges shall be designed to adequately carry drainage waters through project sites.

Significance After Mitigation

Given the relatively small amount of new paved surfaces the proposed Expenditure Plan would create, and considering the available mitigation measures, impacts would not be significant after mitigation.

4 Project Alternatives

This chapter summarizes the various alternatives considered during preparation of the Expenditure Plan. Key features of each alternative are presented, and potential impacts are discussed and compared to the proposed Expenditure Plan.

CEQA mandates consideration and analysis of alternatives to the proposed project (Proposition X Expenditure Plan). According to CEQA Guidelines, the range of alternatives "shall include those that could feasibly accomplish most of the basic purposes of the project and could avoid or substantially lessen one or more of the significant impacts" (Section 15126(d)(2)). The alternatives may result in new impacts that do not result from the proposed project.

Environmental analysis precedents suggest that the discussion of alternatives need not be exhaustive and that alternatives be subject to a construction of reasonableness. The impacts of the alternatives may be discussed "in less detail than the significant effects of the project proposed" (CEQA Guidelines §15126(d)(3)). Also, the Guidelines permit analysis of alternatives at a less detailed level for general plans and other program EIRs, compared to project EIRs. Quantified information on the alternatives is presented where available; however, in some cases only partial quantification can be provided because of data or analytical limitations.

4.1 DESCRIPTION OF ALTERNATIVES

Two alternatives to the Expenditure Plan, described in detail in Chapter 2, were considered over the course of the planning process. These include the No Project Alternative, and the One Cent Transportation Sales Tax Alternative described below. Appendix B includes a table listing the detailed similarities and differences between the No Project Alternative, proposed Expenditure Plan (1/2 Cent Sales Tax) Alternative, and the One Cent Transportation Sales Tax Alternative.

4.1.1 NO PROJECT ALTERNATIVE

Consideration of the No Project Alternative is required by CEQA in all EIRs. It cannot be assumed that the No Project scenario excludes all new transportation improvements, as many new projects have been funded, regardless of the proposed Expenditure Plan. Therefore, the No Project Alternative constitutes those transportation improvement projects that would still occur if the proposed Transportation Sales Tax Reauthorization (Proposition X) were not approved. The No Project Alternative, represents the minimum program of investments that would occur in San Francisco without the transportation sales tax. It is consistent with San Francisco's committed program in the 2001 MTC Regional Transportation Plan. Although the No Project Alternative includes several of the major improvements described in Chapter 2 for the proposed project, less funding would translate to fewer improvements overall for the No Project Alternative.

The No Project Alternative contains the following major projects (all of which are also in the Expenditure Plan and were described in more detail in Chapter 2):

- Third Street Light Rail, Phase 1: Initial Operating Segment.
- Third Street Light Rail, Phase 2: Central Subway.
- Caltrain Downtown Extension to a rebuilt Transbay Terminal.
- Caltrain Electrification.
- Golden Gate Bridge South Access (Doyle Drive).[1]

In addition to the major projects listed above, the No Project Alternative includes several projects and changes that have recently occurred (since year 2000) or will occur within San Francisco.

Outside of San Francisco, the No Project Alternative includes all of MTC's 2001 RTP committed projects. Some of these projects that may have an impact on travel within and through within San Francisco include the BART extension to San Francisco International Airport and Millbrae; the BART-Oakland International Airport connector; the BART extension from Warm Springs to San Jose; Caltrain Express service between San Francisco and San Jose; expansion of Capital Corridor service; Rapid Bus Transit along the San Pablo Avenue corridor in the East Bay; the Vallejo intermodal ferry terminal; the fourth bore for the Caldecott Tunnel; and various roadway and freeway modifications.

In addition to the improvements listed above, several assumptions were made about programs that, by their nature, are not input into the transportation model. These programs are assumed to occur through the life of the project, including the years 2025 – 2034, but with the following changes:

- *Paratransit/Americans with Disabilities Act Improvements (ADA).* Continued support for paratransit operations would be prioritized, as would the program to comply with ADA requirements, e.g. accessible curbs and signals at intersections.
- *Transit Maintenance/Rehabilitation.* Prioritization of vehicle and infrastructure maintenance will be required without Expenditure Plan funds. Some work will have to be delayed or foregone so that high-priority maintenance projects can continue.
- *Street and Traffic Safety.* Street repair will continue at a slower pace and with less intensity than would be possible with Expenditure Plan funds.
- *Pedestrian and Bicycle Circulation and Safety.* These programs will continue, but at reduced levels, with limited additional usability and safety enhancements.
- *Tree Planting.* A scaled back plan for maintenance of tress will continue, but additional tree planting will be significantly curtailed.

---

[1] This project, sponsored by SFCTA and Caltrans, entails replacement of Doyle Drive to improve seismic and traffic safety. Under the No Project Alternative, the reconstruction of this facility would be limited to replacement, rather than the comprehensive multi-modal redesign of the facility that is proposed in the Project Alternative.

4.1.2 ONE CENT ALTERNATIVE

The One Cent Transportation Sales Tax Alternative considered the additional transportation improvement projects that would be funded if the Expenditure Plan were based on revenues from a one cent sales tax, rather than the Proposition X half-cent sales tax. This would fund additional transportation programs and projects, beyond those identified in the proposed Expenditure Plan. The intent of this alternative was to further improve the transportation system and reduce potential impacts of the proposed Expenditure Plan.

The One Cent Transportation Sales Tax Alternative builds on the Expenditure Plan. In addition to the full set of projects and improvements assumed for the Expenditure Plan, this alternative includes the following additional or modified projects:

- *Geary LRT.* The Geary BRT "B" line was converted into a light rail line. In this alternative, the same headways and operating speeds west of Laguna were assumed as for the BRT. In addition, the removal of travel lanes on Geary was identical to the BRT alternative. It was assumed that the Geary LRT would enter a subway east of Laguna. The subway would travel under Geary to Union Square where it would hook up to the Central Subway. The Geary subway would branch off the Central Subway south of Market to end at the Transbay Terminal. Seven stops were included between Laguna and the Transbay Terminal. As with the BRT service in the Expenditure Plan alternative, the 38 Geary bus would provide owl service.
- *Van Ness LRT.* A new light rail route called the V was created. The V was assumed to run on Van Ness from North Point to Market Street where it would run above ground to Duboce and Church. At that point, it would follow the alignment of the N Judah to LaPlaya. The V was coded with headways similar to other light rail lines. One travel lane in each direction was removed on Van Ness from North Point to Market Street.
- *Geneva BRT.* It was assumed that the BRT portion would be on Geneva from San Jose Avenue to Santos Street and would be served by the 9X San Bruno Express during the day, and by the 9 San Bruno during the evening. The 9 would be extended to City College in the evening. TPS improvements were assumed on the sections of Geneva not in the BRT corridor. The BRT service would require one travel lane in each direction. The travel time on the BRT segment was reduced to reflect the increased speeds. The headways of the 9X and the 9 (evening) were reduced to take into account the travel timesavings from the BRT portion.
- *Historic Street Cars.* The Historic Trolley was extended to the Presidio through the Fort Mason Tunnel.
- *Trolley Bus Extensions.* Several trolley bus lanes were extended as part of this alternative. No travel lanes were taken for these extensions.
- *Richardson Avenue Slip Ramp.* This one lane ramp was added from the northbound section of Richardson (U.S. 101) to Gorgas Avenue.

Two additional projects were included in the One Cent Sales Tax Alternative, but were not evaluated using the model: 1) roadway improvements in the vicinity of 16th Street at the intersection with the Caltrain line; and 2) reduction of traffic impacts of Crossover Drive through

Golden Gate Park. Both projects involve changes at the intersection level, for which the San Francisco Travel Demand Model is not sensitive.

4.2 COMPARISON OF ALTERNATIVES - IMPACTS

The following sections compare the potential environmental impacts of each of the alternatives to the proposed Expenditure Plan. Both the environmental advantages and disadvantages are presented in each issue area discussion.

4.2.1 TRANSPORTATION

The transportation analysis is more detailed than other issue areas, as it is a key issue of the proposed Expenditure Plan. Transportation model runs were conducted for both the No Project and One Cent Transportation Sales Tax Alternatives. Additional information on the transportation analysis for the No Project Alternative is provided in Section 3.2 of this EIR, as it is necessary to present No Project and Expenditure Plan information side by side for a meaningful transportation analysis.

The One Cent Transportation Sales Tax Alternative offers slight environmental advantages over the proposed Expenditure Plan with regards to vehicle trips, miles traveled at LOS F, and transit ridership. As can be expected, the No Project offers no advantages over either the proposed project or One Cent Sales Tax Alternative.

Average Travel Time Per Trip

Average auto travel times increase between 2000 and 2025 regardless of which alternative is examined. Table 4-1 shows that auto travel times between the 2025 No Project, Expenditure Plan, and One Cent alternatives do not change significantly.

Transit travel times between the alternatives demonstrate noticeable changes. The 2025 No Project Alternative has the highest transit travel time of the future alternatives. The Expenditure Plan Alternative reduces travel times by five percent, or more than a minute and a half compared with the No Project Alternative. Average transit travel times in the One Cent Alternative are not significantly different than the Expenditure Plan Alternative.

Table 4-1: Average Travel Time Comparison – Internal SF Trips Only

	2000	*2025*		
Average Travel Time	*Base*	*No Project Alternative*	*Expenditure Plan Alternative*	*One Cent Alternative*
Transit	33:26	33:40	32:02	31:58
Auto	10:52	11:16	11:18	11:18

Source: SF-TDM, SFCTA, May 2003.

Vehicle hours traveled

Because San Francisco population and employment are projected to increase, the total number of vehicle trips increases by the year 2025, compared to year 2000. As a result, the amount of vehicle miles and vehicle hours traveled on San Francisco roadways will also increase. The results for all alternatives are summarized in Table 4-2.

The Expenditure Plan Alternative results in a significant reduction in vehicle trips and the fewest vehicle hours of travel, though the amount of vehicle hours of travel is only slightly higher in the One Cent Alternative. However, as vehicle miles of travel are higher in the Expenditure Plan Alternative than in the One Cent Alternative, this implies higher average speeds in the Expenditure Plan.

Table 4-2: Daily Vehicle Miles and Vehicle Hours Comparison – San Francisco Links

	2000	*2025*		
Attribute	*Base*	*No Project Alternative*	*Expenditure Plan Alternative*	*One Cent Alternative*
Total Daily Vehicle Trips	1,323,400	1,423,600	1,403,000	1,400,700
Daily Vehicle Miles of Travel	9,342,200	10,638,100	10,556,000	10,545,800
Daily Vehicle Hours of Travel	482,100	621,600	617,400	617,600

Source: SF-TDM, SFCTA, May 2003.

Vehicle miles traveled (VMT) at level of service (LOS) F

By 2025, a substantial increase is expected in vehicles miles traveled at LOS F as a result of population and employment growth. Table 4-3 describes the anticipated measures for all alternatives. Although the aggregate VMT is only projected to grow a small amount, the VMT on roadways with congestion (defined as Level of Service F) are anticipated to grow significantly by 2025.

The Expenditure Plan Alternative results in almost two percent less VMT at level of service "F" compared with the No Project Alternative. The One Cent Alternative results in a slight improvement over the Expenditure Plan.

Table 4-3: VMT and VMT LOS F Comparisons – San Francisco Links

	2000	*2025*		
Measure	*Base*	*No Project Alternative*	*Exp Plan Alternative*	*One Cent Alternative*
VMT	9,342,200	10,638,100	10,556,000	10,545,800
VMT LOS F	920,900	2,039,400	2,002,500	1,993,000
% of VMT	9.9%	19.2%	19.0%	18.9%

Source: SF-TDM, SFCTA, May 2003. Percentages may not be exact due to rounding.

Number of Work Opportunities within 30 minutes by Auto and Transit

Anticipated results for all alternatives are shown in Table 4-4. The amount of employment accessible via auto does not vary by more than one percent amongst all future alternatives. Employment accessibility by transit in the Expenditure Plan Alternative grows by almost 14 percent (38,900 jobs) compared to the No Project Alternative. The One Cent Alternative gains a further 1.2 percent, or 4,000 jobs, compared with the Expenditure Plan Alternative.

Table 4-4: Accessibility Comparisons – San Francisco Residents

	2000	*2025*		
Accessibility Measure	*Base*	*No Project Alternative*	*Expenditure Plan Alternative*	*One Cent Alternative*
Employment within 30 minutes by auto	569,900	625,800	624,800	622,900
Employment within 30 minutes by transit	239,600	282,000	320,900	324,900

Source: SF-TDM, SFCTA, May 2003.

Transit Ridership

Table 4-5 describes the estimated daily transit boardings for all alternatives across several transit operators, including MUNI, BART, Golden Gate Transit, AC Transit, Caltrain, SamTrans, and ferries. An increase in population and employment results in a 24 percent increase in boardings for the No Project Alternative over year 2000. In the Expenditure Plan Alternative, an additional 44,700 boardings (3.9 percent) occur compared with the No Project Alternative. The One Cent Alternative results in a modest gain of 1.5 percent in boardings compared with the Expenditure Plan Alternative

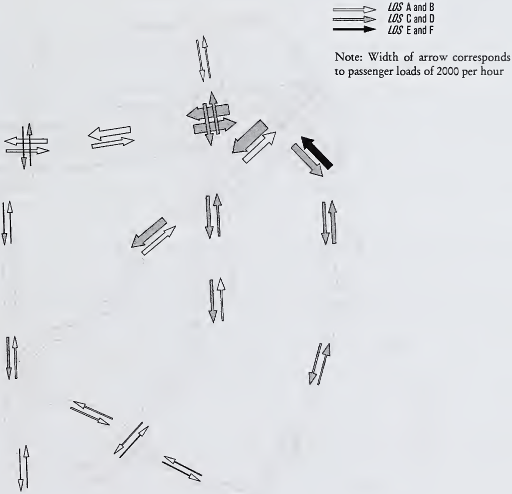
Table 4-5: Transit Boardings

	2000	*2025*		
	Base	*No Project Alternative*	*Expenditure Plan Alternative*	*One Cent Alternative*
Total Daily Transit Boardings	930,000	1,153,500	1,198,200	1,216,300

Source: SF-TDM, SFCTA, May 2003.

The 2025 One Cent Alternative Transit map shown in Figure 4-1: One Cent Alternative Transit Screenlines illustrates the projected effect of increased transit ridership on the level of service (LOS) in select corridors. The LOS at Geary/Arguello and Van Ness/Lombard improves due to the highest capacities of LRT assumed in those corridors. Furthermore, inbound LOS at the 3rd/Townsend screenline declines due to a slight increase in demand, placing the volume-to-capacity ratio at 0.81 (just in the Category E range). Ridership and transit capacities in the Mission corridor decline due to the reduction in service on the 49 associated with implementation of LRT on Van Ness.

Figure 4-1: One Cent Alternative Transit Screenlines, 2025



Note: Width of arrow corresponds to passenger loads of 2000 per hour

4.2.2 AIR QUALITY

Under both the No Project and One Cent Sales Tax alternatives, air emissions in the county would increase over existing conditions. This is primarily due to the increase in VMT by private and transit vehicles. The differences in total annual emissions among the two alternatives and the Expenditure Plan would be highly dependent on the shift towards more transit-based travel, reduced usage of private vehicles and shift in fuel technology towards electric vehicles.

No Project Alternative

The No Project Alternative would result in significantly higher emissions from on-road vehicles and increased transit use than existing conditions due to substantial growth within San Francisco and throughout the Bay Area. While emission factors are projected to decline significantly from 2000 to 2025, the increase in VMT would cause a net increase in emissions over existing conditions. When compared to the proposed Expenditure Plan, the No project Alternative would result in an increase in emissions of ROG, CO and PM-10 in the order of 17.8, 31.7 and 10.6 tons per year, respectively. NOx emissions would be 0.8 tons per year lower under the No Project alternative when compared to the Expenditure Plan.

One Cent Transportation Sales Tax Alternative

This alternative would result in greater transit use (particularly those powered by electricity) and lower private vehicle use, when compared to both the No Project and the proposed Expenditure Plan. This change results in a net decrease in ROG, NOx, CO and PM-10 emissions when compared to both scenarios. When compared to the Expenditure Plan, emissions of ROG, NOx, CO and PM-10 would be lower by 10.5, 8.7, 12.4 and 1.6 tons per year, respectively. When compared to the No Project conditions, emissions of ROG, NOx, CO and PM-10 would be lower by 28.3, 7.9, 44.1 and 12.2 tons per year, respectively (see Table 4-6 below). Implementation of the One Cent Sales Tax Alternative would result in the lowest emissions among all alternatives. This is primarily due to the reduction in private vehicle use (even greater than that under the Expenditure Plan) and a significant reduction in the VMT by diesel-powered MUNI motor coaches due to a shift towards electric-powered transit vehicles. Increase in ferry activity would be the same as under the Expenditure Plan. This increase in emissions would be more than offset by the emissions reductions resulting from the MUNI fleet turnover towards electric vehicles and the reduced private vehicle VMT.

Table 4-6: Comparison of the No Project Alternative and the One Cent Sales Tax Alternative to the Expenditure Plan

Alternative	*Change in Emissions over 2025 with Expenditure Plan (tons per year)*			
	ROG	*NOx*	*CO*	*PM-10*
No Project (2025)	+17.8	-0.8	+31.7	+10.6
2025 with One-Cent Sales Tax Alternative	-10.5	-8.7	-12.4	-1.6

4.2.3 BIOLOGY

Neither the No Project Alternative nor the One Cent Transportation Sales Tax Alternative would have impacts on biological resources that could be considered significantly different than those generated by the Expenditure Plan.

No Project Alternative

Changes to the proposed project under the No Project Alternative primarily consist of changes in the addition or deletion of bus routes and rail extensions within fully urbanized areas. The major capital projects outlined under the proposed project (the Third Street light rail line and the reconstruction of Doyle Drive), which are expected to have the greatest impacts on biological resources of any of the projects outlined under the Expenditure Plan, would still occur under this alternative as they were designated as "Track 1" projects under the 2001 MTC RTP. Therefore, impacts under the No Project Alternative would not differ significantly from those under the Expenditure Plan.

One Cent Transportation Sales Tax Alternative

The One Cent Sales Tax Alternative builds on the Expenditure Plan using additional revenue generated by the increased sales tax. Additional projects proposed under this alternative are limited to additional LRT lines, BRT corridors, historic streetcar and trolley bus extensions, and grade separations between roads and rail lines. It is likely that these additional projects will take place in fully urbanized areas or within existing rights-of-way. Therefore, relative to the proposed Expenditure Plan, the One Cent Alternative is not expected to generate any new impacts, or an increase in impacts, on biological resources within San Francisco.

4.2.4 CULTURAL RESOURCES

Potential impacts on cultural resources could occur as a result of either the No Project or One Cent Transportation Sales Tax Alternative. Similar to the proposed project, new construction under either alternative would have the potential to affect known or unknown historic or prehistoric resources. Because the amount of construction is slightly less for the No Project Alternative, the risk of impact is slightly less than for the proposed Expenditure Plan. The One Cent Alternative would have a higher potential for adverse effects than the proposed Expenditure Plan, due to more construction of transportation improvements.

4.2.5 ENERGY

Under both the No Project and One Cent Transportation Sales Tax alternatives, energy use in the city would increase over existing conditions. This is primarily due to the increase in VMT by private and transit vehicles. The differences in total average daily energy use among the two alternatives and the Expenditure Plan would likely not be more than one percent, and are highly dependent on the level of implementation of fuel efficient transit vehicles in San Francisco. Table 4-7 summarizes energy use by alternative.

No Project Alternative

The No Project Alternative would result in significantly higher on-road vehicle energy use and increased transit energy use than existing conditions due to existing plans to grow transit service in and to San Francisco. The overall energy consumption under this alternative would be 77.78 billion BTU per day. This constitutes a 13 percent increase in energy consumption when compared to 2000 conditions. When compared to 2025 conditions with the Expenditure Plan, the No project Alternative would result in a very small (approximately 0.2 percent) increase in energy usage.

One Cent Transportation Sales Tax Alternative

The One Cent Transportation Sales Tax Alternative would result in slightly higher energy use by transit due to the greater intensity of transit infrastructure and a reduction in energy use by on-road vehicles, when compared to both the No Project and the implementation of the Expenditure Plan. The overall energy consumption under this alternative would be 78.09 billion BTU per day. Implementation of the One Cent Sales Tax Alternative alone (i.e. increase over 2025 No Project conditions) would result in an increase in energy consumption for transportation system uses of 0.31 billion BTU. This constitutes a 0.4 percent increase in energy use over the No Project alternative and 0.6 percent increase over the proposed Expenditure Plan. Under this alternative, though there would be a greater decrease in energy use associated with private vehicles, the increase in transit energy use would create an overall increase in total energy use, compared to the proposed Expenditure Plan.

Table 4-7: Energy Usage by Transportation Systems (billion BTU)

	2000	*2025*	
	Base	*No Project Alternative*	*Expenditure Plan Alternative*
Vehicle Use	59.95	67.70	67.17
Transit Use	9.62	10.08	10.45
Total	69.07	77.78	77.62

Source: SF-TDM, SFCTA, Environmental Science Associates, 2003.

4.2.6 GEOLOGY AND SEISMICITY

No Project Alternative

The most significant geologic impacts would be those resulting from the exposure of people to earthquake-related geologic hazards. The population of the Bay Areas is expected to grow substantially over the next two decades, bringing more people into San Francisco, with or without any transportation improvements, and increasing the risks of injuries and loss of life in a major earthquake. While some of the potential risks to travelers using new transportation improvements proposed in the Expenditure Plan would be avoided under the No Project Alternative, these same travelers would still be subject to geologic risks on portions of the existing transportation system. On balance, the No Project Alternative is likely, in the event of a major earthquake, to pose the greatest risks to people and property. While the proposed project will include a number of new transportation structures and facilities, each will be designed to current engineering and seismic resistance standards, reducing their individual chances of failure.

One Cent Sales Tax Alternative

The new construction and transit projects added to the proposed Expenditure Plan under this Alternative would improve seismic safety as new projects are designed to current seismic standards. However, it also includes construction of new facilities in areas susceptible to severe ground shaking in an earthquake. The One Cent Sales Tax Alternative therefore would have somewhat higher potential geologic impacts than the proposed project. Nevertheless, since this alternative would also include all of the seismic retrofit work proposed in the Project Alternative, it would, on balance be about the same as the proposed project and preferable to the No Project Alternative.

4.2.7 HAZARDOUS MATERIALS

No Project

The most significant hazardous materials impacts would be those resulting from the exposure of people to hazardous materials during construction and project operations. Fewer construction activities associated with proposed transportation facilities and improvements would occur and therefore, the potential to encounter and/or disturb hazardous materials during construction would be lower (compared to the proposed Expenditure Plan). However, humans and the environment would forgo the beneficial effects of the proposed project in terms of the reduction in the amount of petroleum and fuel products consumed in San Francisco would not be realized under this alternative.

One-Cent Sales Tax Alternative

The new construction and transit projects added to the proposed project under this alternative would involve additional construction activities that would increase the potential to encounter and/or disturb hazardous materials. This alternative would also increase the use of hazardous materials, such as petroleum products, fuels, spent oil, and solvents used during project operations. This alternative therefore would have a higher potential hazardous materials impact than the proposed project.

4.2.8 NOISE

Under both the No Project and One Cent Sales Tax alternatives, noise from construction and operation of transportation systems in the city would increase over existing conditions. This is primarily due to the increase in activity of private and transit vehicles associated with population and employment growth in the city. The differences in noise impacts of the two alternatives would be highly localized and would depend on the existing noise environment at those sites. As in the case of the Expenditure Plan, the analysis of these impacts is more appropriate at a project level than at a program level.

No Project Alternative

Noise impacts from construction would be lower under the No Project alternative as the construction activities associated with some of the transportation improvements in the Expenditure Plan would not take place. However, private vehicle travel on the streets of San Francisco would be higher under this alternative when compared to the Expenditure Plan. Therefore, associated noise impacts would also be higher. On the other hand, transit activity of MUNI, Caltrain, and ferries and the associated noise impacts would be lower. Overall, the noise impacts under this alternative would be slightly lower than the Expenditure Plan. However, project-level analysis at individual project sites may or may not find significant impacts depending on the nature of the project, the distance to sensitive receptors, the presence of intervening barriers and the existing noise environment at the site.

One Cent Transportation Sales Tax Alternative

Construction noise impacts would be greatest under this alternative due to the greater intensity of transportation improvements being considered under this alternative. However, noise from private vehicle travel would be lowest under this alternative when compared to both the Expenditure Plan and the No Project alternative. On the other hand, transit activity (primarily that of MUNI) and its associated noise impacts would be greater when compared to the Expenditure Plan and the No Project alternative. Noise Impacts from Caltrain and ferry activity would be the same as under the Expenditure Plan. Overall, the noise impacts under this alternative would be comparable to those under the Expenditure Plan.

4.2.9 VISUAL RESOURCES

There are no quantifiable differences between the alternatives and the proposed project, in terms of effects on visual resources, due to the tradeoffs involved in projects and programs.

No Project

The No Project Alternative would involve construction of most, but not all, of the major projects identified for the Expenditure Plan. Thus, the Expenditure Plan Alternative has only slightly more construction impacts than the No Project Alternative. Although construction activities may cause short-term, localized adverse impacts, completed transportation improvements may or may not detract from the City's visual qualities. The effect of new transportation improvements is subjective in nature – some viewers may see the improvements as positive effects, while other viewers may feel the improvements are adverse.

Despite the fact that the No Project Alternative would result in fewer changes in the urban landscape (and possibly cause fewer visual impacts), it also lacks the significant funding in the

Expenditure Plan for street tree planting and landscape/tree maintenance. The Expenditure Plan also contains provisions for enhanced Presidio access as part of the Doyle Drive major capital project. While the Doyle Drive replacement project is included in the No Project Alternative, funding from the Expenditure Plan may allow this enhanced Doyle Drive scenario to be realized. These projects, identified for the proposed Expenditure Plan, would provide a positive effect on the visual character of the city and would partially offset adverse effects of new construction.

One Cent Transportation Sales Tax Alternative

The One Cent Transportation Sales Tax Alternative would result in slightly more construction and more new facilities than the Expenditure Plan, as well as slightly more tree planting and maintenance. Potential impacts on visual resources would be about the same as identified for the proposed Expenditure Plan.

4.2.10 WATER RESOURCES AND FLOODING

Both the No Project and One Cent Transportation Sales Tax Alternatives would result in impacts similar to those identified for the proposed project. The differences in construction among the alternatives would not change the significance of potential impacts and all impacts could be reduced to levels that are not significant, with implementation of mitigation measures identified for the proposed Expenditure Plan.

4.3 ENVIRONMENTALLY SUPERIOR ALTERNATIVE

CEQA Guidelines require identification of an environmentally superior alternative. Table 4-7 summarizes the environmental advantages and disadvantages of the two alternatives, compared to the proposed Expenditure Plan. Based on the analysis in Section 4.2, the One Cent Alternative is the environmentally superior alternative, though its environmental advantages over the Expenditure Plan Alternative are not great.

As shown in the table, there are tradeoffs among the various issue areas. In general, the One Cent Alternative improves marginally upon the benefits of the Expenditure Plan Alternative which in turn improves significantly upon the No Project Alternative. In several cases, the overall difference between the One Cent Alternative and proposed Expenditure Plan is one-half percent or less. Generally, the benefits of the One Cent Alternative are mostly pronounced in transportation; however, in the case of travel time impacts, the Expenditure Plan actually generates more travel times savings than the One Cent Alternative, because more travel lanes are required for conversion of lanes to transit facilities in the One Cent Alternative.

In terms of air quality and hazardous materials, the One Cent Alternative generally performs better than the Expenditure Plan Alternative as a result of the greater investment in transit. Impacts in terms of energy of the Project and One Cent alternatives are comparable, although the Project alternative performs marginally better. In the areas of cultural resources, geology/seismicity, hazardous materials, noise and visual impacts, many of the impacts for both build alternatives include short-term construction impacts which are localized and temporary. Also, construction of several major projects will still occur under the No Project scenario. The advantage in the noise issue area is also relatively minor, due to the tradeoff between auto versus transit noise. Substantive disadvantages for the No Project Alternative are found in air quality, energy use, and transportation, which are three key issue areas in San Francisco.

Thus, the One Cent Transportation Sales Tax Alternative provides slight environmental advantages over the proposed project and substantial improvements over the No Project Alternative.

Table 4-7: Summary of Environmental Advantages and Disadvantages of Alternatives, Compared to the Proposed Project

Environmental Issue Area	*No Project Alternative*	*One Cent Transportation Sales Tax Alternative*
Transportation:		
a. Travel time	-	0/+
b. Vehicle Hours Traveled	-	0
c. Accessibility	-	+
d. VMT at LOS F	-	0
e. Transit ridership	-	+
Air Quality	-	+
Biology	0	0
Cultural	+	-
Energy	-	-
Geology	-	0
Hazardous Materials	+	0
Noise	0	0
Visual	+	0
Water Resources and Flooding	0	0

NOTE: + denotes advantage compared to proposed project

- denotes disadvantage compared to proposed project

0 denotes no substantive difference, compared to proposed project

5 CEQA Findings

This chapter provides specific additional analysis as required by CEQA (Sections 15126 and 15130): growth-inducing impacts; significant unavoidable impacts; significant irreversible environmental changes; cumulative impacts; and a summary of impacts found not to be significant.

5.1 GROWTH-INDUCING IMPACTS

The EIR must examine the potential growth-inducing effects of the proposed Proposition and associated New Expenditure Plan. Specifically, CEQA Guidelines require that the EIR "discuss the ways in which the proposed project could foster economic or population growth, or the construction of additional housing, either directly or indirectly" (CEQA Guidelines 15126.2(d)).

Induced growth in this EIR refers to the potential for transportation improvements in the proposed Expenditure Plan to generate population and employment growth beyond levels currently anticipated in regional and local plans.

The following section describes projected population, households, and employment based on the MTC 2001 RTP Baycast Model, followed by conclusions about how the proposed Expenditure Plan may affect growth.

5.1.1 GROWTH TRENDS AND PROJECTIONS

San Francisco has experienced steady growth in the past 20 years. According to the Association of Bay Area Governments (ABAG), the City increased by 97,800 residents and 30,700 households between 1980 and 2000. This represents a 14 percent increase in population over the last two decades. Economic growth has matched population growth in the City, as well. Employment grew by 82,200 jobs, or nearly 15 percent, between 1980 and 2000, while employed residents increased by 97,800. This growth has placed tremendous pressure on the City's transportation systems. Table 5-1 lists growth trends in population, households, and employment from 1980 to 2000.

Table 5-1: Growth Trends in San Francisco, 1980-2000

	1980	*1985*	*1990*	*1995*	*2000*
Population	678,974	718,500	723,959	751,700	776,733
Household Population	654,511	693,100	699,330	728,700	756,976
Households	298,956	308,020	305,584	309,620	329,700
Employed Residents	347,091	381,900	391,292	379,800	444,851
Employment	552,200	553,440	579,180	559,300	634,430

Source: ABAG Projections 1990 (1980-1985 data); ABAG Projections 2000 (1990-1995 data); ABAG Projections 2002.

According to the MTC 2001 RTP Baycast Model, population growth is expected to slow within the coming 20 years, while employment growth is projected to accelerate. Because current MTC 2001 RTP projections only reach a horizon year of 2025, population, households, and employment figures were extrapolated through 2035 using the Baycast Model's 2020 and 2025 data. This model shows that San Francisco will have a net increase of 14,400 residents between 2000 and 2035 – an increase of less than two percent. According to the MTC 2001 RTP Baycast Model, population is expected to peak in 2010 (at 814,300) and then slowly decline to 791,200 in 2035, while the number of households is expected to continue growing to 2035; thus, the slight decline in population beyond 2010 is expected to result from a slight decrease in the average household size. However, employment in the City is projected to soar, with 135,700 new jobs added between 2000 and 2035. This 21 percent increase in employment will further strengthen San Francisco's position as the major employment center in the region, and may increase in-commuting and/or exacerbate demand on both regional and cross-town transit connections.

Table 5-2 lists growth projections in population, households, and employment through 2035, while Chart 5-1 illustrates historic trends and growth projections graphically.

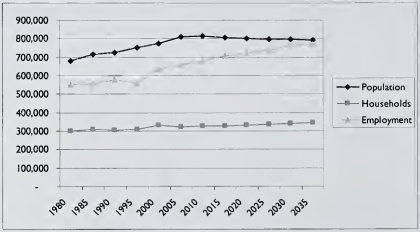
Table 5-2: Growth Projections in San Francisco, 2000-2035

	2000	*2005*	*2010*	*2015*	*2020*	*2025*	*2030*	*2035*
Population	776,733	811,697	814,252	807,539	803,099	798,809	798,213	791,159
Household Population	756,976	791,051	793,541	786,998	782,671	778,490	777,909	771,035
Households	329,700	321,340	325,601	328,413	330,765	334,623	339,756	343,511
Employed Residents	444,851	438,653	452,779	459,039	465,517	463,118	462,857	458,765
Employment	634,430	657,445	681,789	707,004	723,083	738,271	763,426	770,124

Please note: Household population is assumed to remain a steady 97.46 percent of total population through 2035.

Source: ABAG Projections 2002 (2000 data); MTC 2001 RTP Baycast Model (2005-2025 projections); Extrapolation of MTC 2001 RTP Baycast Model inputs (2030-2035 projections).

Chart 5-1: Historic Trends and Growth Projections in San Francisco, 1980-2035



5.1.2 GROWTH-INDUCING ANALYSIS

With respect to population growth, San Francisco is likely to continue experiencing population changes with or without major transportation improvements. The factors most affecting potential growth include housing cost and availability, as well as in-migration, birth and death rates, and job opportunities, etc. The quality of the local transportation system has a lesser impact on overall growth compared to these other factors.

All factors considered, it is unlikely that the transportation improvements proposed in the Expenditure Plan will be of sufficient magnitude to stimulate growth beyond the projected population and employment increases. There are three main reasons for this:

First, it is evident that transportation investment in general – and increased capacity in particular – currently lag behind the growth that has already occurred in San Francisco and in the Bay Area. This situation exists because of the general constraint on transportation funding available for system capacity expansion given other priorities for maintaining and sustaining the vast transportation network, as well as physical constraints to expanding roadway capacity in San Francisco. At an aggregate level, while improvements identified in the Expenditure Plan will have slightly beneficial transportation impacts compared to baseline, these impacts are small compared to changes in population and employment – for example, population and employment in the City are projected to grow 2.8 percent and 16.4 percent respectively between 2000 and 2025, while difference between the 2025 Expenditure Plan and 2025 Baseline for average travel time (see Table 3.2-4) and total vehicle hours of travel (see Table 3.2-5) are less than one percent. Thus, improvements featured in the Expenditure Plan will help support the projected population and employment growth, rather than induce it.

Second, increased congestion may actually discourage an increase in employment in San Francisco beyond current projections. For example, the percent of vehicle miles traveled at LOS F (see Table 3.2-8) are projected to increase over the next 25 years, with or without the Expenditure Plan.

Finally, the transportation improvements identified are consistent with the projected and planned growth in the Bay Area as identified by ABAG through consultation with the City and County of San Francisco, which determines the land available for new development. The Project would not alter the amount of land identified by the city for future development; rather, it is designed to compliment and support the city's proposals to concentrate future development along transit routes and transfer points (see Figure 5.1. Proposed Citywide Land Use Action Plan and Figure 5.2 Proposed Rapid Transit Network).

In general, enhanced transportation capacity does not per se create more growth, but rather can affect the timing and distribution of growth. Furthermore, land use distribution effects of transit changes (as opposed to roadway improvements) are likely to be somewhat limited. Thus, there may be some localized effect relating to the timing and location of development in areas of the city that need more direct, convenient routes and expanded transit service. However, this situation does not imply that such improvements would induce additional growth beyond what is already planned. Thus, the Project is responsive to travel demands resulting from existing land use while also supportive of future plans. The Project will not direct future growth to new unplanned and undeveloped areas.

5.2 SIGNIFICANT UNAVOIDABLE IMPACTS

According to CEQA Guidelines, an EIR must discuss any significant environmental impacts that cannot be avoided under full implementation of the proposed project. Each issue area analysis in Chapter 3 categorizes the significance of identified impacts. According to these analyses, no significant unavoidable impacts are identified for the proposed sales tax reauthorization and associated Expenditure Plan.

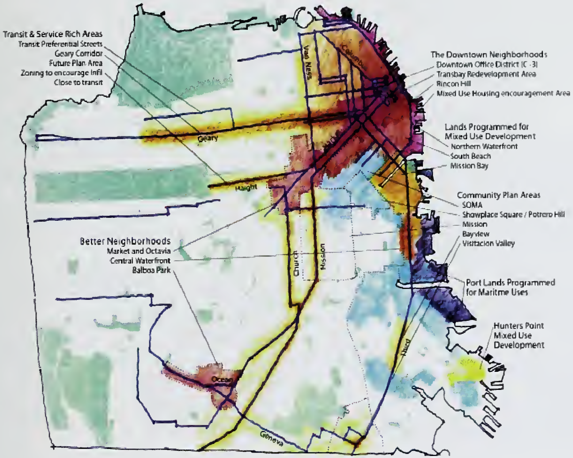
5.3 SIGNIFICANT IRREVERSIBLE ENVIRONMENTAL CHANGES

The EIR must also examine irreversible changes to the environment. More specifically, CEQA Guidelines require the EIR to consider whether "uses of nonrenewable resources during the initial and continued phases of the project may be irreversible since a large commitment of such resources makes removal or nonuse thereafter unlikely" (CEQA Guidelines 15126.2(c)). "Nonrenewable resource" refers to the physical features of the natural environment, such as land, air, waterways, etc.

5.3.1 ENERGY SOURCES

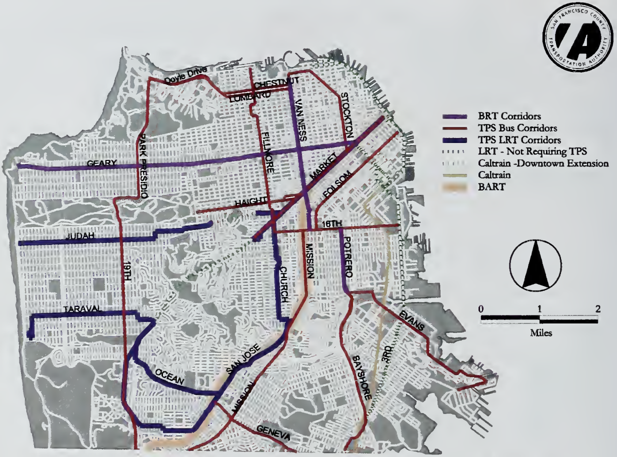
New transportation facilities under the proposed Expenditure Plan would result in the commitment of existing and planned sources of energy, which would be necessary for the construction and daily use of the transit system. Energy use is fully analyzed in Section 3.6 of this EIR. As described in Section 3.6 and compared in Section 4.2, energy use under the proposed project would be less than for other alternatives considered in this analysis. Since the proposed project would be improving the transit system, fewer private vehicle trips would occur (compared to the No Project Alternative) and less overall energy would be consumed for operation of the transportation system.

Figure 5.1: Proposed Citywide Land Use Action Plan


Transit & Service Rich Areas
Transit Preferential Streets
Geary Corridor
Future Plan Area
Zoning to encourage Infil
Close to transit
The Downtown Neighborhoods
Downtown Office District (C-3)
Transbay Redevelopment Area
Rincon Hill
Mixed Use Housing encouragement Area
Lands Programmed for Mixed Use Development
Northern Waterfront
South Beach
Mission Bay
Community Plan Areas
SOMA
Showplace Square / Potrero Hill
Mission
Bayview
Visitacion Valley
Port Lands Programmed for Maritme Uses
Hunters Point Mixed Use Development
Better Neighborhoods
Market and Octavia
Central Waterfront
Balboa Park
Van Ness
Columbus
Geary
Haight
Church
Mission
Third
Ocean
Geneva

Source: "Overview of the Citywide Action Plan, San Francisco Planning Department, August 2002.

Figure 5.2: Proposed Transit Priority Network Action Plan



Basemap: San Francisco Department of Public Works

Prepared: April 24, 2003

Source: Transportation Authority, 2003.

5.3.2 CONSTRUCTION-RELATED CHANGES

Irreversible commitments of natural resources would occur during the course of constructing new projects made possible by the proposed sales tax reauthorization and Expenditure Plan. New construction would result in the consumption of building materials, many of which are made from nonrenewable resources. Construction equipment running on fossil fuels would be needed for excavation and the shipping of building materials. Electricity and water would be used during construction for a variety of purposes. Individual construction projects have been or will be assessed through a detailed project-level environment review, in accordance with CEQA requirements.

5.3.3 AIR QUALITY

As described in Section 3.3, implementation of the proposed Expenditure Plan would represent an improvement in air quality conditions, compared to future conditions without the Expenditure Plan. Therefore, the proposed project would not contribute to long-term adverse irreversible changes to the environment.

5.4 CUMULATIVE IMPACTS

CEQA requires that the EIR examine cumulative impacts. As discussed in CEQA Guidelines 15130(a)(1), a cumulative impact "consists of an impact which is created as a result of the combination of the project evaluated in the EIR together with other projects causing related impacts." The analysis of cumulative impacts need not provide the level of detail required of the analysis of impacts from the project itself, but shall "reflect the severity of the impacts and their likelihood of occurrence" (CEQA Guidelines 15130(b)).

In order to assess cumulative impacts, the EIR must analyze either a list of past, present, and probable future projects or a summary of projections contained in an adopted general plan or related planning document. For this program EIR, MTC 2001 RTP Baycast Model growth projections were used, as described above in Section 5.1.

It is important to note that the proposed Expenditure Plan is essentially a set of projects, representing the cumulative transportation scenario for the reasonably foreseeable future. Therefore, analysis of the Expenditure Plan, combined with future baseline projections, represents the cumulative impact assessment.

5.4.1 TRANSPORTATION

Because the Expenditure Plan is an additional funding source added to the MTC RTP assumptions, all other existing and funded transportation projects at both a countywide and regional level by 2025 are assumed. Similarly, the basis of the RTP is the ABAG Projections 2000, which is an adopted projection of land use/demographic growth to 2025 based on many complex variables. As a result of adding the Expenditure Plan to this regional land use and transportation baseline, the resulting travel demand produced for the proposed project condition is considered identical to the cumulative condition for CEQA purposes. Please see Section 3.2 for further details on cumulative transportation effects. In summary, the Expenditure Plan's contribution to the cumulative scenario will be beneficial, as it will improve the transportation network and reduce traffic congestion.

5.4.2 AIR QUALITY

As stated in Section 3.3, a significant cumulative air quality impact would occur if future emissions are above today's levels and the increase is primarily related to travel demand increases due to regional growth. Implementation of the Expenditure Plan, along with future planned growth and increased traffic in San Francisco and the Bay Area, in general could increase the regional pollution burden of the air basin. There could be a significant air quality impact from cumulative development throughout the Bay Area. However, since the Expenditure Plan's individual impact on air quality would be beneficial, it would not contribute to potential cumulative adverse air quality impacts.

5.4.3 BIOLOGY

Implementation of transportation improvements in the Expenditure Plan, combined with other projected development in the city could result in potentially significant impacts on biological resources by degrading wetlands and other sensitive natural communities and affecting special-status plant and wildlife species. In addition, other transportation improvements in the Expenditure Plan not identified as having a direct impact on biological resources may result in individually minor impacts locally. Collectively, these individually minor impacts on biological resources may become significant over time. Mitigation measures identified for the proposed project in Section 3.4 would reduce these potential impacts to levels that are not significant.

5.4.4 CULTURAL RESOURCES

Cumulative development in the city would have the potential to disturb historic and prehistoric cultural resources during the course of construction. Mitigation measures identified in Section 3.5 would reduce this cumulative effect to a level that is not significant.

5.4.5 ENERGY

The combination of planned background growth and Expenditure Plan projects along with other transportation improvements within San Francisco could significantly increase energy consumption.

The implementation of other planned transportation improvements during the period from 2000 to 2025 is part of the cumulative scenario. The energy calculations for the 2025 No Project scenario incorporate these projects and plans, including improvements to bus systems that serve the city from other areas, such as AC Transit and SamTrans.

Indirect energy impacts would occur from the production of fuel used in automobiles, the transportation of this fuel to the end user, and the production and transmission of electrical energy. There would also be cumulative impacts on energy consumption associated with the population- and employment-induced travel growth in the region.

As noted in Section 3.6 (Energy), the Expenditure Plan would represent a decrease in energy consumption, relative to the cumulative scenario without the Plan. Therefore, although cumulative development may cause a significant impact, the Expenditure Plan's contribution to cumulative effects would be beneficial, as it would reduce energy consumption relative to the No Project scenario.

5.4.6 GEOLOGY

The projected population increase in the Bay Area will result in increased travel on all modes of transportation throughout the entire Bay Area, including the City and County of San Francisco. This would result in an increased risk of exposure of people and property to the potentially damaging effects of strong ground shaking and seismic-related hazards. The potential for structural failures, injuries, and loss of life would be greatest on earthquake susceptible soils. The cumulative impacts from the proposed project are essentially the same as the direct impacts identified in Section 3.7, and are considered to be potentially significant. Mitigation measures identified in Section 3.7 would apply to cumulative effects. The Expenditure Plan also includes several new infrastructure projects that improve the seismic conditions in the city.

5.4.7 HAZARDOUS MATERIALS

The projected population increase and Expenditure Plan implementation would result in increased travel on all modes of transportation throughout the city. The proposed transportation projects would result in an increased risk of exposure of people and property to hazardous materials during future projects' construction and operation phases. These cumulative impacts are the same as the impacts outlined for the proposed project in Section 3.8. The previously listed mitigation measures in Section 3.8 would address public and property exposure to hazardous materials associated with this impact. It should be noted that the Expenditure Plan also enables turnover of the transit vehicle fleet to cleaner technologies, reducing the demand for non-renewable fuels.

5.4.8 NOISE

Implementation of the projects in the Expenditure Plan, along with future growth and increase in traffic volumes in San Francisco would increase ambient noise levels throughout the city.

Ambient noise in several areas of San Francisco could increase significantly due to cumulative effects of projects under the Expenditure Plan and other planned development in the city. Therefore this would be a significant cumulative impact. Though over the long term, some projects included in the Expenditure Plan would contribute to the cumulative noise level, with the implementation of mitigation measures identified for the proposed project, the contribution would not be considerable. It should be noted that the Expenditure Plan also includes several traffic calming projects and projects that increase roadway system operations and efficiency, which would help reduce noise impacts.

5.4.9 VISUAL RESOURCES

Future projected development in the city, combined with Expenditure Plan transportation improvements, would have the potential to create adverse effects on the city's visual resources and character. The degree of impact will depend on whether new development will substantially obstruct key views and/or alter the city's visual characteristics. Collectively, individually minor visual impacts may become significant over time. Mitigation measures identified in Section 3.10 would reduce potential impacts to levels that are not significant.

5.4.10 WATER RESOURCES

The projected population and employment increase in the city and Bay Area would result in increased travel on all modes of transportation throughout the city. The proposed transportation projects could result in an increased risk of water quality degradation and alteration to watersheds or channels. These cumulative impacts are essentially the same as the direct impacts outlined in Section 3.11 and could be mitigated by measures identified for the proposed project.

5.5 IMPACTS FOUND NOT TO BE SIGNIFICANT

This EIR focuses on potentially significant impacts. CEQA requires that an EIR provide a brief statement indicating why various possible significant impacts were determined to not be significant and were not discussed in detail. For the issue areas addressed in Chapter 3, all potential impacts are identified, regardless of their magnitude. Issue areas determined to not be significant include:

Agricultural Resources – Agricultural resources do not exist in San Francisco, as the city is a developed urban environment. Therefore, no agricultural resources will be adversely affected by the implementation of the proposed Expenditure Plan.

Land Use and Planning – The proposed project, as a whole, does not represent a change in land use itself, and will neither create substantive changes in land use patterns nor cause significant land use incompatibilities. The proposed Expenditure Plan would not create conflicts with adopted local and state plans. On the contrary, the Expenditure Plan is designed to accommodate and be consistent with projected and planned land uses in the city, particularly plans to concentrate land uses along key transit corridors.

The city's land use policies, development goals, and area plans are in direct alignment with the transportation improvements in the expenditure plan. For example, plans for redeveloping the eastern neighborhoods are enhanced by the Third Street light rail line. Thus, the city's strategies for land use and housing are compatible with the Expenditure Plan. Minor short-term land use conflicts may occur during construction of transportation improvements, but these effects are not expected to be significant. Project-specific environmental impact evaluations will be required to address this issue.

Mineral Resources – The proposed Expenditure Plan will not affect mineral resources, as no substantive mineral resources have been identified in the study area.

Population and Housing – Growth-inducing effects are analyzed in Section 5.1 of this EIR, including information on projected population and the project's impact on growth. The proposed Expenditure Plan will not affect temporary or permanent housing.

Public Services and Utilities – Implementation of the proposed Expenditure Plan will not cause a significant increase in demand for public services or utilities.

Recreation – No significant adverse effects on recreational uses or facilities are expected. Minor, short-term adverse effects may occur if any of the Expenditure Plan projects are constructed near recreational facilities.

6 Report Authors

This Draft EIR has been prepared by:

SAN FRANCISCO COUNTY TRANSPORTATION AUTHORITY

SFCTA
100 Van Ness Avenue, 25th Floor
San Francisco, CA 94102

Tilly Chang, *Manager of Planning*
Billy Charlton, *Project Manager*

Planning Staff

Forest Atkinson, *Planner*
Rachel Hiatt, *Planner*

GIS and Graphics Staff

Nancy Schneider, *Senior Planner*
Joe Castiglione, *Consultant*

CONSULTING TEAM

Dyett & Bhatia, Urban and Regional Planners

Rajeev Bhatia, AICP, *Principal-in-Charge*
Vicki Hill, *Associate Principal*
Rosalyn Stewart, AICP, *Senior Planner*
Jenny Johnston, *Planner*
Analivia Suchman, *Planner*
Millicent Moran, *Project Associate*
Kirsten Lawrence, *GIS Specialist*
Mark Chambers, *Graphics Manager*

Environmental Science Associates, Environmental Consultants

Marty Abell, AICP, *Vice President*
Jyothi Iyer, *Senior Associate I (Air, Noise and Energy)*
Martha Lowe, *Associate II (Biological Resources)*
Jennifer Schulte, *Associate III (Geology and Seismicity, Hazardous Materials, and Water Resources)*
Michelle Kondo, *Associate III (Hazardous Materials)*
Anjanette Latta, *Associate II (Water Resources)*
Emily Silverman, *Senior Associate I (Geology and Seismicity)*
Heidi Vonblum, *Associate I (Hazardous Materials)*

DKS Associates

Joe Story, AICP, *Principal*

7 References and Glossary of Agency Acronyms

Association of Bay Area Governments (ABAG). 1995. *The San Francisco Bay Area -- On Shaky Ground.* ABAG, Publication Number P95001EQK. April.

Association of Bay Area Governments (ABAG). 1998. *The San Francisco Bay Area -- On Shaky Ground,* Supplement Report (Excerpts).

Association of Bay Area Governments (ABAG). 2002. *Projections 2002.*

Association of Bay Area Governments (ABAG). 2003a. *Earthquake Hazards Map for San Francisco,* http://www.abag.ca.gov/cgi-bin/pickmapx.pl

Association of Bay Area Governments (ABAG). 2003b. *Modeled Shaking Intensity Map for San Francisco, 1989 Loma Prieta and 1906 San Andreas Earthquake,* http://www.abag.ca.gov/cgi-bin/pickmapx.pl.

Association of Bay Area Governments (ABAG). 2003c. *Earthquake Hazard Map for San Francisco Based on Underlying Geologic Materials,* http://www.abag.ca.gov/cgi-bin/pickmapx.pl.

Association of Bay Area Governments, Bay Area Air Quality Management District, Metropolitan Transportation Commission. 1994. *Proposed Final San Francisco Bay Area Redesignation Request and Maintenance Plan for the National Carbon Monoxide Standard.* July.

Association of Bay Area Governments, Bay Area Air Quality Management District, Metropolitan Transportation Commission. 1999. *San Francisco Bay Area Ozone Attainment Plan for the 1-Hour National Ozone Standard.* June.

Association of Bay Area Governments, Bay Area Air Quality Management District, Metropolitan Transportation Commission. 2001. *Revised San Francisco Bay Area Ozone Attainment Plan for the 1-Hour National Ozone Standard.* October.

Barbour, M.G., and J. Major. 1977. *Terrestrial Vegetation of California, second ed. California Native Plant Society, Publication No. 9,* Berkeley, California.

Bay Area Air Quality Management District. 1999. *BAAQMD CEQA Guidelines – Assessing the Air Quality Impacts of Projects and Plans.* December.

Bay Area Air Quality management District. 2000. *2000 Bay Area Clean Air Plan.* December.

Beranek, Leo L., 1998. *Noise and Vibration Control.*

Bolt, Beranek and Newman, U.S. EPA, 1971. *Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances.*

Bolt, Bruce A. 1988. *Earthquakes,* W.H. Freeman and Company, New York, New York.

California Air Resources Board. 2001. *State and national Area Designations Maps of California,* available at http://www.arb.ca.gov/desig/adm/adm.htm

California Air Resources Board. 2003. *Forecasted Emissions by Summary Category*, available at http://www.arb.ca.gov/app/emsinv/fcemssumcat.html, as of June 2003.

California Building Standards Commission (CBSC). 1995 *California Building Code, Title 24, Part 2.*

California Department of Fish and Game. 2001. *California Natural Diversity Database*, Version 2.1.2., updated 2003. Data request for San Francisco County.

California Department of Fish and Game. 2002. *List of California Terrestrial Natural Communities Recognized by the California Natural Diversity Data Base.* CDFG, Wildlife and Habitat Data Analysis Branch, California Natural Diversity Data Base. May.

California Department of Transportation (Caltrans). 1998. *Technical Noise Supplement – A Technical Supplement to the Traffic Noise Analysis protocol.* October.

California Energy Commission (CEC). 1994. *Energy and the Economy.*

California Energy Commission (CEC). 1999. *Fuels Report.* July.

California Energy Commission. 1997. *Critical Changes: California's Energy Future, The California Energy Plan.* December.

California Energy Commission. 2000. *California Energy Outlook 2000, Volume II, Transportation Energy Systems.* August.

California Energy Commission. 2002. Information from California Energy Commission website. Available at http://www.energy.ca.gov/ as of May.

California Geological Survey (formerly California Division of Mines and Geology). 1997a. *How Earthquakes Are Measured,* CDMG Note 32.

California Geological Survey (formerly California Division of Mines and Geology). 1997b. *Guidelines for Evaluating the Hazard of Surface Fault Rupture,* CDMG Note 49.

California Geological Survey (formerly California Division of Mines and Geology). 1997c *Guidelines for Evaluating and Mitigating Seismic Hazards*, CDMG Special Publication 117.

California Geological Survey (formerly California Division of Mines and Geology). 1997a. *How Earthquakes Are Measured*, CDMG Note 32.

California Geological Survey (formerly California Division of Mines and Geology). 1997b. *Guidelines for Evaluating the Hazard of Surface Fault Rupture*, CDMG Note 49.

California Geological Survey (formerly California Division of Mines and Geology). 1997c *Guidelines for Evaluating and Mitigating Seismic Hazards*, CDMG Special Publication 117.

California Geological Survey ShakeMap Working Group (California Geological Survey, Pacific Gas & Electric, University of California Berkeley, and United States Geological Survey). 2003. http://quake.usgs.gov/research/ strongmotion/effects/shake/about.html, accessed April.

California Native Plant Society. 2000. *Electronic Inventory of Rare and Endangered Vascular Plants of California, Version 1.5.1.* Data request for San Francisco County.

California State Water Resources Control Board (SWRCB) and California Coastal Commission (CCC), 2000. *Plan for California's Nonpoint Source Pollution Control Program*. November. Accessed at http://www.swrcb.ca.gov/ nps/prtecting.html.

California State Water Resources Control Board (SWRCB). 1997. *Industrial Activities Storm Water General Permit*. Available at http://www.swrcb.ca.gov/stormwtr

California State Water Resources Control Board (SWRCB). 2003. *Waste Discharge Requirements for Storm Water Discharges from Small Municipal Separate Storm Sewer Systems (MS4s) (General Permit), National Pollutant Discharge Elimination System (NPDES) General Permit and Fact Sheet.* Draft. January 8.

Chasse, M., Fontaine, M., and Mangnaghi, E. No Date. *Rediscovered Presidio Species*. Available online at: http://www.cnpsyerbabuena.org/rare presidio species .htm.

City and County of San Francisco Website. *General Plan*, online: http://sfgov.org/planning/egp/index.htm

City and County of San Francisco, Planning Department. 1995. *Environmental protection – An Element of the Master Plan of the City and County of San Francisco.* Adopted in August.

City and County of San Francisco, Planning Department of the. 1996. *Community Safety – An Element of the Master Plan of the City and County of San Francisco.* March.

City and County of San Francisco, Planning Department of the. 1996. *Community Safety – An Element of the Master Plan of the City and County of San Francisco.* March.

City and County of San Francisco, Planning Department. 1997. *San Francisco General Plan.*

City and County of San Francisco. 1997. *San Francisco General Plan,* Community Safety Element, adopted April 27, 1997 by the San Francisco Planning Commission, approved August 11, 1997 by the Board of Supervisors

City and County of San Francisco. 1997. *San Francisco General Plan, Community Safety Element,* adopted April 27, 1997 by the San Francisco Planning Commission, approved August 11, 1997 by the Board of Supervisors.

City of San Francisco Department of Public Works Bureau of Engineering. 1986. *Map of the City and County of San Francisco.* June.

City of San Francisco. 1997. *Zoning Map of the City and County of San Francisco.* August.

Cogswell, H.L. 1977. *Water Birds of California.* University of California Press, Berkeley, California. California Natural History Guides: 40.

Dyett and Bhatia, 2001. *Draft Regional Transportation Plan for the San Francisco Bay Area Environmental Impact Report.* San Francisco, CA, August.

EIP Associates. 1993. *Ranier Avenue Town Connector and U.S. 101 Interchange Project DEIR,* prepared for the City of Petaluma. July.

Energy Information Administration, U.S. Department of Energy. 1999. *Annual Energy Review 1998.*

Environmental Science Associates. 2002. *Doyle Drive Environmental and Design Study: Final Natural Environmental Study.* Prepared for San Francisco County Transportation Authority, SFCTA Contract No. 99/00-7.

Federal Transit Administration, U.S. Department of Transportation, 1998. *Third Street Light Rail Project Final EIS/EIR.* Prepared for City and County of San Francisco Planning Department, November.

Federal Railroad Administration, 2000. *Federal Register.* January, 13.

Fix, D., and A. Bezener. 2000. *Birds of Northern California.* Lone Pine Press, Renton, Washington.

Garth, J.S. and J.W. Tilden. 1986. *California Butterflies.* University of California Press, Berkeley, California. California Natural History Guides: 51.

Goals Project. 1999. *Baylands Ecosystem Habitat Goals.* A report of habitat recommendations prepared by the San Francisco Bay Area Wetlands Ecosystem Goals Project. U.S. Environmental Protection Agency, San Francisco, Calif./S.F.Bay Regional Water Quality Control Board, Oakland, California.

Hart, E.W. 1997. *Fault-Rupture Hazard Zones in California: Alquist-Priolo Earthquake Fault Zoning Act of 1972 with Index to Earthquake Fault Zones,* California Geological Survey (formerly known as California Division of Mines and Geology), Special Publication 42, 1990, revised and updated.

Helley, E.J. and K.R. Lajoie. 1979. Flatland Deposits, *Their Geology and Engineering Properties and Their Importance to Comprehensive Planning. Selective Examples from the San Francisco Bay Region, California*, U.S.G.S. Professional Paper 943.

Hickman, J.C., ed. 1993. *The Jepson Manual: Higher Plants of California.* University of California Press, Berkeley.

Holland, R.F. 1986. *Preliminary Descriptions of the Terrestrial Natural Communities of California.* California Department of Fish and Game, Sacramento, California.

International Conference of Building Officials (ICBO). 1997. *Uniform Building Code*, Whittier, California.

Jennings, C.W. 1994. *Fault Activity Map of California and Adjacent Areas*, California Geological Survey (formerly California Division of Mines and Geology) Data Map No. 6, 1:750,000.

Lindeburg, M. 1998. *Seismic Design of Building Structures: A Professional's Introduction to Earthquake Forces and Design Details*, Professional Publications Inc.

Munz, P.A., and D.D. Keck. 1968. *A Flora of California and Supplement.* University of California Press, Berkeley.

National Geographic Society.1997. *Birds of North America.* National Geographic Press, Washington, D.C.

National Park Service/Presidio Trust. 2001. *Presidio Vegetation Management Plan and Environmental Assessment.* U.S. Department of the Interior, National Park Service, Presidio Trust, December 2001. Available online: http://www.presidiotrust.gov/VMP/VMP_Table_of_contents.asp.

Peterson, et.al. 1999. California Geological Survey (formerly California Division of Mines and Geology), *Seismic Shaking Hazard Maps of California.*

Peterson, M.D., Bryant, W.A., Cramer, C.H. 1996. *Probabilistic Seismic Hazard Assessment for the State of California*, California Geological Survey (formerly California Division of Mines and Geology) Open-File Report issued jointly with U.S. Geological Survey, CDMG 96-08 and USGS 96-706.

Philips, Steven P., Hamlin, Scott N. And Yates, Eugene B. 1993 *Geohydrology, Water Quality and Estimation of Ground-Water Recharge in San Francisco, California, 1987-92.* U.S. Geological Survey, Water Resources Investigations Report 93-4019. Prepared in Cooperation with the San Francisco Water Department.

San Francisco Bay Conservation and Development Commission (SFBCDC). 2001. *Nonpoint Source Pollution Report and Proposed Work Program.* August 24.

San Francisco Bay Regional Water Quality Board (RWQCB). 1995. *San Francisco Bay Basin (Region 2) Water Quality Control Plan (Basin Plan).* June.

San Francisco Bay Regional Water Quality Control Board (RWQCB). 2002. *National Pollutant Discharge Elimination System* (NPDES) Permit No. CA0037664, Order No.2002-0073, for City and County of San Francisco Southeast Water Pollution Control Plant, North Point Wet Weather Facility, and Bayside Wet Weather Facilities, adopted June 19.

San Francisco Field Ornithologists. 2002. *San Francisco Breeding Bird Atlas.* Available online: http://www.sffo.org/Atlas/San%20Francisco%20Breeding%20Bird%20Atlas.htm#_Toc8809824

San Francisco Public Utility Commission. 2003. *Website: http://sfwater.org/home.cfm*, accessed May.

Schlocker, J., Geology of the San Francisco North Quadrangle, California, 1974. *U.S. Geological Survey Professional Paper 782*, 109p.

Seed, R.B. 1990. *Preliminary Report on the Principal Geotechnical Aspects of the October 17, 1989 Loma Prieta Earthquake*, University of California at Berkeley.

U.S. Department of Energy (DOE). 2000. *Clean Cities Game Plan 2000, Strategic Plan for the Clean Cities Program.* January.

U.S. Department of the Interior. 1990. *MMS- Pacific OCS Region. California, Oregon and Washington Archaeological Resource Study.* November.

U.S. Department of Transportation, Federal Transit Administration. 1995. *Transit Noise and Vibration Impact Assessment*, April.

U.S. Environmental Protection Agency (USEPA), 2000a. *Human Health Fact Sheet: Methodology.* Revised Methodology for Deriving Health-Based Ambient Water Quality Criteria.

U.S. Environmental Protection Agency (USEPA). 2000b. *Storm Water Phase II Final Rule.* EPA 833-F-00-001, January 2000, Fact Sheet 1.0

U.S. Environmental Protection Agency (USEPA). 2003. *Total Maximum Daily Loads, Listed Water Information for San Francisco Bay*, Center 1. Cycle: 1998. March 17, 2003. Accessed at http://www.oaspub.epa.gov/pls/tmdl/ enviro.control?p .

U.S. Environmental Protection Agency. 1981. *Noise Effects Handbook.* July.

U.S. Fish and Wildlife Service. 2003. *Species List for 203039-S.F. County Transit Authority Expenditure Plan EIR*, San Francisco County, California. April 16.

U.S. Fish and Wildlife Service. 1983. *The Ecology of San Francisco Bay Tidal Marshes: A Community Profile.* FWS/OBS-83/23. October.

U.S. Fish and Wildlife Service. 1994. *The Ecology of Eelgrass Meadows in the Pacific Northwest: A Community Profile.* FWS/OBS-84/24, September.

U.S. Geological Society (USGS) Working Group on California Earthquake Probabilities (WG02). 2003. *Earthquake Probabilities in the San Francisco Bay Region: 2003-2032 – A Summary of Findings*, http://quake.usgs.gov/ research/seismology/wg02/summary/,

URS Consultants/John A. Blume and Associates. 1974. *San Francisco Seismic Safety Investigation.*

Wood, M. 1998a. *Focus on Rarities: Plants of Yerba Buena Island, Part II.* Available online: http://www.cnps-yerbabuena.org/rare_ybi2.html. June.

Wood, M. 1999. Focus on Rarities: *San Francisco wallflower, Erysimum capitatum*. Available online: http://www.cnps-yerbabuena.org/ rare_erysimum_fr.html. December.

Wood, M. 2002. *Focus on Rarities: California Croton, Croton californicus.* Available online: http://www.cnps-yerbabuena.org/ rare_croton.html. March.

Wood, M. 1996a. *Focus on Rarities: San Francisco Collinsia, Collinsia multicolor.* Available online: http://www.cnps-yerbabuena.org/rare_collinsia.htm. March.

Wood, M. 1996b. *Focus on Rarities: San Francisco Orchids.* Available online: http://www.cnps-yerbabuena.org/rare_orchids.htm. June.

Wood, M. 1997. *Focus on Rarities: San Francisco Bay Spineflower, Chorizanthe cuspidata var. cuspidata.* Available online: http://www.cnps-yerbabuena.org/rare_chorizanthe .html.

Wood, M. 1998b. *Focus on Rarities: Northern Coastal Salt Marsh.* Available online: http://www.cnps-yerbabuena.org/rare_nco_saltmarsh.html. September.

Zeiner, D.C., W.F. 1999. *Laudenslayer, K.E. Mayer and M. White. California's Wildlife.* Vols. I, II and III. California Statewide Wildlife Habitat Relationships System (Version 7.0). California Department of Fish and Game. Sacramento, CA.

Glossary of Agency Acronyms

The following abbreviations are used for Sponsoring Agencies throughout the report:

BART	Bay Area Rapid Transit District
Caltrans	California Department of Transportation
DOE	Department of the Environment
DPT	Department of Parking and Traffic
DPW	Department of Public Works
MUNI	San Francisco Municipal Railway
PJPB	Peninsula Joint Powers Board (Caltrain)
Planning	Planning Department
SFCTA	San Francisco County Transportation Authority
SFRA	San Francisco Redevelopment Agency
TJPA	Transbay Joint Powers Authority

Appendix A: Notice of Preparation

NOTICE OF PREPARATION (NOP)

ENVIRONMENTAL IMPACT REPORT (EIR)

SAN FRANCISCO COUNTY TRANSPORTATION AUTHORITY: EXPENDITURE PLAN AND SALES TAX REAUTHORIZATION

Date: May 7, 2003

To: Responsible Agencies, Interested Parties, and Organizations

From: Tilly Chang – Manager of Planning

Subject: **Notice of Preparation (NOP) of an Environmental Impact Report (EIR) for the San Francisco County Transportation Authority Proposed Expenditure Plan and Sales Tax Reauthorization**

The San Francisco County Transportation Authority (Authority) is preparing an Expenditure Plan for the reauthorization of the 1989 Proposition B transportation sales tax, and is developing a programmatic Environmental Impact Report (EIR) for the Expenditure Plan. The Authority, as Lead Agency under the California Environmental Quality Act (CEQA), requests your input regarding the scope and content of environmental analysis that is relevant to your agency's statutory/regulatory responsibilities in order to ascertain potential impacts of the proposed program of projects. The Authority, in compliance with CEQA, will direct the preparation of an EIR for the project. The project description is provided on the following pages. An initial study is not attached, and is not required.

CEQA Guidelines Section 15082(b) mandates each Responsible Agency to respond to a NOP within thirty days (30) after receipt. The review period will extend from May 8, 2003 through June 9, 2003. Please send your written response, with the name of your agency contact person, to the following address:

Tilly Chang, Manager of Planning
San Francisco County Transportation Authority
100 Van Ness Avenue, 25th Floor
San Francisco, CA 94102

Your views and comments on how the project may affect the environment are welcomed. Please contact Tilly Chang at (415) 522-4832 if you have any questions regarding this NOP.

Tilly Chang, Manager of Planning
San Francisco County Transportation Authority

Date

NOTICE OF PREPARATION (NOP)

ENVIRONMENTAL IMPACT REPORT (EIR)

SAN FRANCISCO COUNTY TRANSPORTATION AUTHORITY: EXPENDITURE PLAN AND SALES TAX REAUTHORIZATION

1. PROJECT TITLE:

San Francisco County Transportation Authority: Expenditure Plan and Sales Tax Reauthorization

2. LEAD AGENCY NAME AND ADDRESS:

San Francisco County Transportation Authority
100 Van Ness Avenue, 25th Floor
San Francisco, CA 94102

3. CONTACT PERSON AND PHONE NUMBER:

Tilly Chang, Manager of Planning
San Francisco County Transportation Authority
P: (415) 522-4832
F: (415) 522-4829
Tilly_Chang@sfcta.org

4. PROJECT LOCATION:

The Authority is the transportation planning and programming agency for the City/County of San Francisco. San Francisco is the only jurisdiction in California where the City and County governances share the same physical boundary. As shown in Figure 1, the City is located at the northern end of the San Francisco Peninsula and forms the southern portion of the mouth to San Francisco Bay. The City's 46.7 square miles are bordered by the Pacific Ocean to the west, the San Francisco Bay to the north and east, and the cities of Daly City and Brisbane to the south.

San Francisco is an active, compact city laid out on a street grid over rolling topography. Any combination of autos, busses, cable cars, bicyclists and pedestrians can be found moving up and over the city's many hills. The City has long been a magnet for business, culture, retailing, tourism and education. Its rich 150-year history reflects the cultures of the world and gives energetic diversity to its neighborhoods. San Francisco serves as the center of the region, drawing visitors from near and far to a wide range of restaurants, theaters and other nightlife, museums, shopping, special events and festivals, historical sites, and other attractions.

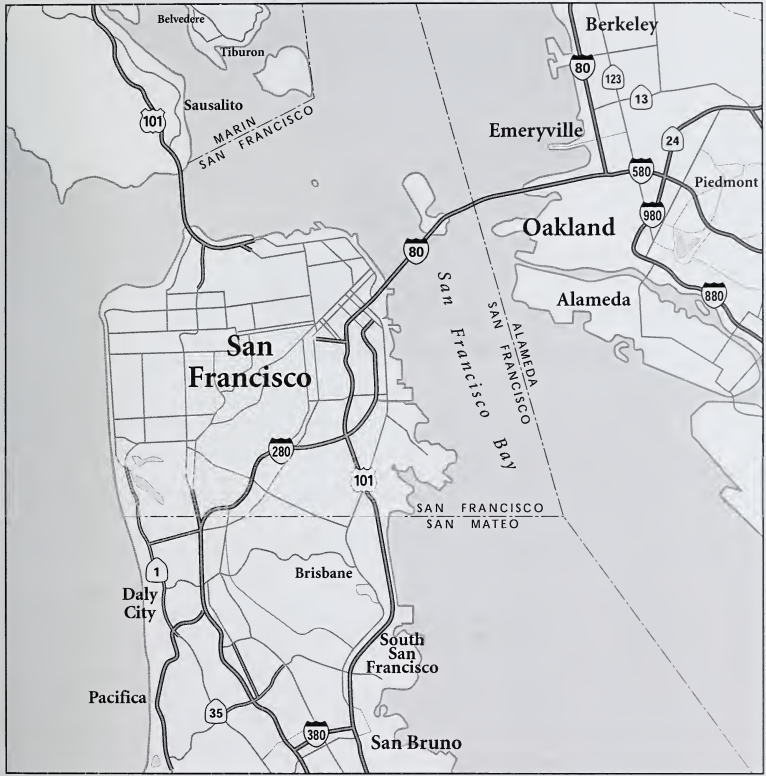


Figure 2-1: Regional Location

5. PROJECT SPONSOR'S NAME AND ADDRESS:

San Francisco County Transportation Authority
100 Van Ness Avenue, 25th Floor
San Francisco, CA 94102

6. GENERAL PLAN DESIGNATION:

Per City/County of San Francisco General Plan.

7. ZONING:

Per City/County of San Francisco Zoning Ordinance.

8. DESCRIPTION OF PROJECT:

EXPENDITURE PLAN AND SALES TAX REAUTHORIZATION

In September 2002, the Authority adopted a schedule for the creation and adoption of an Expenditure Plan for a transportation sales tax reauthorization. The Authority proposes to rescind the current ½-cent sales tax (authorized through Proposition B) and substitute a tax of the same amount, which would start collection in April 2004 and continue for a period of thirty (30) years. The local transportation sales tax rate of ½-cent would not change. The Authority could bond against this revenue stream starting in 2004, and leverage significant amounts of state and federal funding by doing so. It is important to understand that by rescinding and authorizing at the same time, the Expenditure Plan would essentially be revised to provide funding for transportation needs that have surfaced since the original 1989 Expenditure Plan was approved and structured to take advantage of discretionary funding opportunities. If adopted by the Board of Supervisors, a sales tax ordinance will be placed on the November 2003 ballot.

Development of the Authority's Countywide Transportation Plan (CWTP) serves as the foundation of the Expenditure Plan. The Expenditure Plan reflects the policy goals and priorities identified in the CWTP and includes a program of investments to implement the Plan. If approved by the voters of San Francisco, the sales tax measure would enable sales tax revenues to be collected over a thirty (30) year period in San Francisco, for use toward transportation investment. For purposes of this EIR analysis, the proposed project is a program of investments to be funded by a sales tax of ½ cent for a period of 30 years (2033). In addition, both the No Project Alternative and a One-Cent Sales Tax Alternative will be evaluated in the program EIR. As a program EIR, the impact assessment will focus on the Expenditure Plan and Sales Tax Reauthorization as one set of projects and programs.

The primary objectives of the Expenditure Plan are to implement the goals of the CWTP through investment in a set of projects and programs that encompass planning, maintaining and improving the city's multi-modal transportation system. The proposed Expenditure Plan for reauthorization of the ½ cent sales tax has a structure similar to the existing Expenditure Plan, with four main categories of projects and programs: Transit, Paratransit, Streets and Traffic Safety, and Transportation System Management/Strategic Initiatives, although some sub-categories are organized differently (e.g. Bicycle and Pedestrian projects are proposed to be included under Streets and Roads instead of Transportation System Management) and new sub-categories are proposed (e.g. Traffic Calming). The investment breakdown, by category, is shown in Chart 1 and listed in Table 1.

Chart 1: Investment Priorities under the Proposed Expenditure Plan (Prop B Allocations)

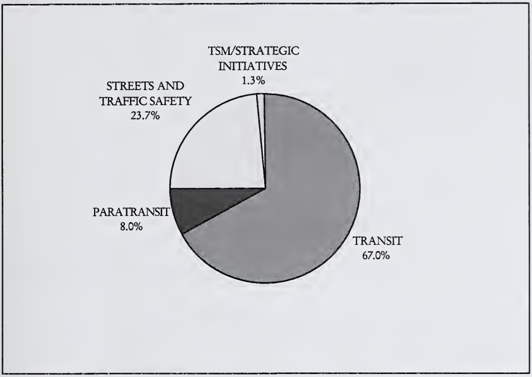


Table 1: Proposed Expenditure Plan Summary (DRAFT)

	Total Cost	*%*	*Total Prop B*	*%*
A. TRANSIT	9,121.94	77%	1,692.52	67.0%
1 Signature Projects (Expansion, Performance and Connectivity)	3,704.5		653.5	
a. MUNI	1,217.0		286.0	
BRT/TPS Network + Real Time Transit Info	500.0		90.0	
Central Subway (3rd St. LRT Ph:2)	647.0		126.0	
3rd Street Light Rail (Ph: 1)	70.0		70.0	
b. Caltrain	2,142.5		312.5	
Downtown Ext./Transbay Terminal	1,885.0		270.0	
Electrification from SF to Gilroy	182.5		20.5	
Baby Bullet Phase 2	75.0		22.0	
c. BART Station Access and Safety	100.0		10.5	
d. Ferry	85.0		5.0	
e. Transit Enhancements	160.0		39.5	
2 Maintenance/Replacement (BART, JPB, MUNI, GG)	5,417.4		1,039.0	
a Vehicles	3,380.0		575.0	
b Facilities	580.1		115.7	
c Infrastructure	1,457.3		348.3	
B. PARATRANSIT	580.0	5%	202.0	8.0%
1 Vehicles	30.0		5.0	
2 Operational Support	550.0		197.0	

C. STREETS AND TRAFFIC SAFETY	2,133.2	18%	600.2	23.7%
1 Major Capital Projects	539.7		116.8	
a. Doyle Drive	420.0		90.0	
b. Bi-County and Other	119.7		26.8	
2 System Operations and Efficiency	155.5		60.6	
a. New Signals and Signs	55.5		41.0	
b. SF Go (All Modes)	100.0		19.6	
3 Maintenance/Replacement	1,153.2		276.7	
a. Traffic Signs and Signals	170.5		99.9	
b. Pavement Resurfacing and Rehabilitation	943.6		162.0	
c Pedestrian and Bicycle Facility Maintenance	31.8		14.1	
d. Other	7.3		0.7	
4 Bicycle and Pedestrian	265.0		145.0	
a. Traffic Calming	120.0		60.0	
b. Pedestrian Circulation/Safety	20.0		10.0	
c. Bicycle Circulation/Safety	40.0		20.0	
d. Curb Ramps/ADA	50.0		20.0	
e. Tree Planting and Maintenance	35.0		35.0	
D. TSM/STRATEGIC INITIATIVES	20.0	0.2%	33.2	1.3%
1 TDM/Parking Management	20.0		13.2	
2 Incentives for Transportation/Land Use Coordination	30.0		20.0	
Total Programmed	**11,865**	100%	**2,527**	100%
Projected Available Funding	**11,960**		**2,250**	
Surplus/Deficit	**95**		**(277)**	

Source: San Francisco County Transportation Authority, May 2003

Highlights of the proposed Plan include:

1. Transit funds are allocated not just to MUNI, the local transit operator, but also to regional operators such as BART and Caltrain, and to ferries. The majority of the transit funds, however, are still for MUNI. In general, transit investment is targeted to network improvements such as system connectivity and reliability. The existing commitment to paratransit is also maintained.
2. Funds are allocated to four proposed signature projects: the Central Subway; extension of Caltrain to a rebuilt Transbay Terminal; a Bus Rapid Transit system on two key corridors; and the reconstruction of Doyle Drive (the access to the Golden Gate Bridge through the Presidio). These committed projects leverage sizable amounts of federal, state and regional funding.
3. The Streets and Traffic Safety category now includes pedestrian and bicycle projects. In the current Proposition B Expenditure Plan, these projects are included in the Transportation System Management (TSM) category, which is only 2 percent of the total Expenditure Plan. In the proposed Expenditure Plan, funds for bicycle and pedestrian projects have been increased significantly, and they are placed in Streets and Traffic Safety because they are part of a continuum of efforts to make better use of the entire street right of way, from property line to property line, which is shared by all modes of transportation, including cars, buses, bicycles and pedestrians.
4. The Plan takes responsibility for paying for the local share of deferred transit and roadway maintenance. In order to capture around $7 billion in regional, state and federal

funds for transit maintenance, the plan must put in place $1.3 billion in local matching funds. This is a very significant number (about half of the total revenues expected from the reauthorized tax), but it is unavoidable if the City wants to maintain the current system and avoid much larger rehabilitation costs, which would occur if regular maintenance were not performed.

5. The Plan creates a new sub-category under Streets and Traffic Safety for traffic calming projects around the City. These projects respond to the growing clamor from neighborhoods to provide an answer to the street safety problems caused by increased cut through traffic in the neighborhoods and related issues. Approximately $4 million per year would be made available to install speed humps, chicanes (narrowing of travel lanes), ladder crosswalks and sidewalk bulb-outs throughout the city, according to a system of priorities tied to safety and neighborhood acceptance.
6. The Plan creates a new category to pay for strategic initiatives, including studies to better integrate transportation with land use densification efforts, such as infill housing development along transit corridors like Geary, Mission and Van Ness, and to provide small scale, highly cost-effective solutions like parking management in the neighborhoods.

EXPENDITURE PLAN SIGNATURE PROJECTS

The Expenditure Plan is composed of many projects and programs, representing physical transportation improvements as well as maintenance and repair programs. The four signature projects in the Plan include the Bus Rapid Transit (BRT) Network, the new Central Subway, the extension of Caltrain to the new Transbay Terminal, and replacement of the southern access to the Golden Gate Bridget (Doyle Drive). The locations of these projects are shown in Figure 2. The specific impacts of these projects are being analyzed in individual environmental analyses, pursuant to CEQA.

Bus Rapid Transit (BRT) and Transit Preferential Streets (TPS) Network

The centerpiece of the proposed Expenditure Plan is the development of Bus Rapid Transit (BRT) corridors along Geary Blvd., Van Ness Avenue and Potrero Avenue, complemented by Transit Preferential Streets (TPS)[1]. Together, the BRT and TPS corridors create an integrated citywide network of high-speed bus service, as an overlay on existing rail service by MUNI, BART and Caltrain.

The new BRT services would include gradual conversion of the fleet to low-floor articulated vehicles with multiple doors, complemented by a proof-of-payment fare system, which will allow much faster boarding and alighting of passengers and shorter dwell times at stops. Among the features of BRT/TPS are traffic signal preemption (to give priority to buses), and real time indicators, to provide critical information to passengers such as the arrival time of the next bus. Small BRT stations and reserved bus lanes would further reinforce the sense of permanence of this service.

This network will result in increased transit performance, decreased travel times and more seamless connectivity between transit systems throughout the city. The concept of BRT/TPS is speed, reliability, and comfort – along with raising the perception of bus service, so that people will find bus travel more attractive and choose to use it regularly.

---

[1] TPS stands for Transit Preferential Streets. This is a concept similar to BRT, but without the exclusive bus lanes or special BRT stations. It is implemented on corridors where the right of way is not available to reserve a lane for the buses. Other components, however, are similar. The same buses that operate BRT corridors can and will operate on TPS streets.

New Central Subway

The Central Subway is the second phase of the 3rd Street Light Rail Line, currently under construction. The 3rd Street Light Rail line connects the Caltrain Station at the San Mateo county line (in Visitacion Valley) to the Caltrain Depot near Pac Bell Park. The Central Subway would extend this 3rd Street line in a subway along 3rd or 4th Street, serving the South of Market neighborhood and the Moscone Convention Center; the subway would cross under Market St., serve Union Square and end in Chinatown.

The Central Subway will link Chinatown to Market Street, BART, and MUNI Metro with a station at Third Street and an underground pedestrian connection to the Montgomery Station. The Central Subway could share link to potential future rapid transit service on Geary Blvd., via a Union Square Station at Geary and Stockton.

This subway will greatly improve transit travel time to downtown from San Francisco's southeastern neighborhoods while enhancing access to and from Chinatown. It will increase transit capacity and level of service in a north-south direction in the Downtown, to complement the already plentiful east-west service. The Central Subway will connect regional transit with Chinatown, which is currently not served by rapid transit. It is expected to carry nearly 90,000 people a day, making it the second most utilized among all the new start projects throughout the country, proposed for funding under the Federal Transit Administration's New Starts Program.

Caltrain Downtown Extension (DTX), Transbay Terminal

This project will build a new Transbay Terminal at the current site at Mission and 1st Streets, and extend the Caltrain commuter rail service in a 1.3-mile tunnel from its current terminus at 4th and King, to the new Transbay Terminal. As a separate but concurrent project, the Caltrain Joint Powers Board is planning to electrify the entire Caltrain Corridor between San Francisco and Gilroy. Both the tunnel and the new terminal building will be designed specifically to accommodate high-speed rail trains.

Structural additions to retrofit the Terminal following the 1989 Loma Prieta Earthquake have compromised the architectural functionality of the building's passenger areas and limit its usability. Aside from the major transit connectivity benefits, a new Transbay Terminal will provide seismic and aesthetic relief to the city's most important transit node. In addition, the extension of Caltrain service to the Transbay Terminal fills an essential gap, connecting transit services in the northern Peninsula and Bay Bridge corridors.

The main benefits of this project result primarily from the extension of Caltrain service to the new terminal thereby improving regional connectivity and reducing transit travel times. Today, Transbay is the place with the highest transit connectivity in the entire region, served by five different transit providers. Yet, the terminals for East Bay and Peninsula rail services have a major gap: the Caltrain terminal is still at 4th and King. Moreover, a substantial amount of congestion along US 101 in San Francisco is caused by through-trips between work locations in northern San Mateo County and residential areas in Alameda County.

The extension of Caltrain service to the Transbay Terminal provides a transit alternative to the northern Peninsula and Bay Bridge corridors. The Caltrain DTX would generate the most new transit riders compared to other proposed rail extensions: between 40 and 60,000 people are expected to come through the terminal when it is completed. Finally, the project will secure San

Francisco's place as the regional terminus for potential future high-speed rail service.

Golden Gate Bridge South Access – Doyle Drive Replacement

The South Access to the Golden Gate Bridge, also known as Doyle Drive, is a vital transportation link between San Francisco, the Presidio National Park, the Golden Gate Bridge, and the North Bay.

This project would replace the current south access to the Golden Gate Bridge with a new facility including tunnels, a parkway, and a causeway over a restored marsh in the Presidio. The replacement project will accomplish three major goals: provide direct multimodal access to the Presidio, improve earthquake safety, and improve operating safety, without increasing the vehicular capacity of the facility. The new facility will encompass two short tunnels – featuring natural ventilation – linked by a parkway. The tunnels would eliminate the visual and physical barrier created by the current elevated structure, and reconnect the Presidio with its Crissy Field coastline on San Francisco Bay. Tennessee Hollow, the Presidio's natural stream, would be linked to an expanded tidal marsh at Crissy Field. The South Access is envisioned to run on a causeway, creating a breathtaking entrance into San Francisco from the Golden Gate Bridge, affording five million visitors a year the most spectacular views of the Golden Gate Bridge and the city, and allowing direct transit access into the Presidio after seven decades of isolation. The design can also easily accommodate the potential extension of the F-line through Fort Mason and the Marina into the Presidio. A new transit center next to the restored Tennessee Hollow will allow people to walk to employment sites in the Presidio and improve pedestrian and bicycle connections, as well.

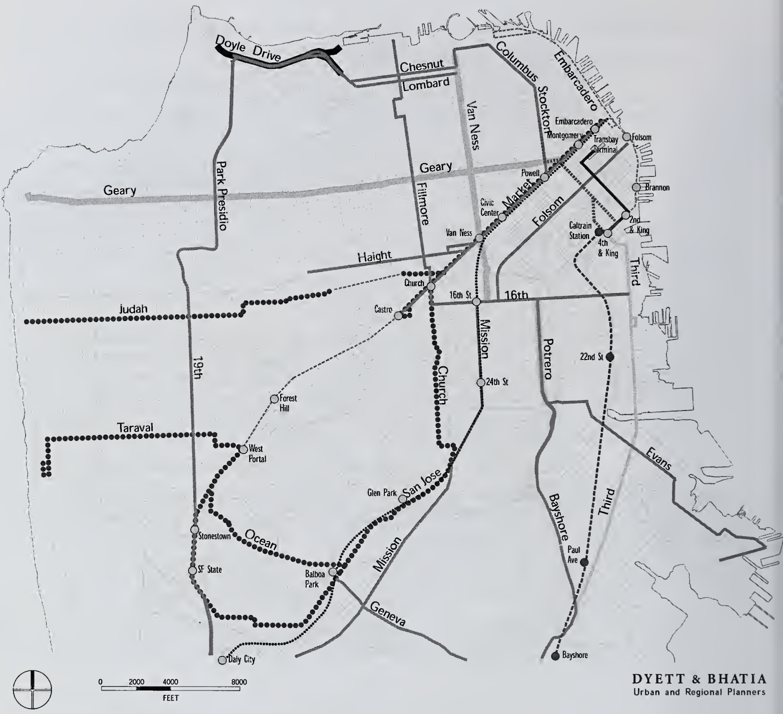


Figure 2-2: Proposed Expenditure Plan Projects

The South Access has been ranked by the Federal Highway Administration as the fifth worst bridge in the nation, and the worst in California. In addition to the seismic threat, including the possibility of structural failure through soil liquefaction at the east end, Doyle Drive does not provide direct access to the Presidio. The lack of shoulders and the absence of a dividing median result in dangerous operating conditions that often resolve in serious accidents. The new South Access will eliminate these dangerous conditions and enable direct access to the Presidio for cars and for the more than 18,000 transit riders that use the system every day.

OTHER EXPENDITURE PLAN COMPONENTS

The following section provides brief descriptions of the other types of projects and programs that comprise the proposed Expenditure Plan. In a number of descriptions, the term "programmatic improvements" is used. This refers to the concept of establishing programs for types of projects, such as traffic calming or the installation of new traffic signals, where the actual location of each project is not yet known or specified. The relevant information provided in these cases includes the kinds of projects that will be eligible for funding under the category, as well as the relative size of the category.

1. **Caltrain Electrification:** Convert Caltrain service, line, and locomotives from diesel-powered to electric-powered between San Francisco and Gilroy. The project includes all stationary systems, substations, and signal system modifications, along with new locomotive rolling stock. Costs reflect San Francisco share only.
2. **Caltrain Baby Bullet Phase 2:** Continued implementation of express tracks between San Francisco and San Jose to improve travel time and reliability. This work may include passing sidings, to allow express trains to bypass local service where double tracking is not appropriate and/or right of way is limited.. Costs reflect San Francisco share only.
3. **3rd Street Light Rail (Phase 1):** Complete construction of trackway, related facilities, and the Metro East light rail maintenance yard, and purchase of new LRVs, including additional LRVs for expanded Mission Bay service.
4. **BART Station Access and Safety:** Individual BART station upgrades to enhance accessibility and safety. Includes construction of emergency egress capacity (e.g. additional staircases), improved signage and security, additional elevators and fare-gates, and new MUNI/BART transfer fare-gates at Embarcadero and Civic Center stations. Also includes real-time traveller information and street-level plaza improvements.
5. **San Francisco Ferry Enhancements:** Improvements to downtown ferry terminals to accommodate a major increase in ferry ridership. Included are additional inter-modal connections, new ferry gates, improved emergency response, and landside improvements to serve increased ferry traffic.
6. **Transit Enhancements:** Programmatic improvement projects that promote system connectivity, close service gaps, improve levels of service, and expand transit services. Includes extension of existing trolleybus lines and electrification of motor coach routes, and purchase of additional trolley buses for new service. Extension of historic streetcar service from Fisherman's Wharf to Fort Mason, including purchase and rehabilitation of Historic LRV's for new service. Balboa Park station area access improvements to enhance bus and MUNI M-line transit connections. Purchase and installation of automatic

station to Oakdale Avenue. Limited F-line incremental operating and maintenance support. Purchase of additional LRVs to expand service and reduce crowding on existing J, K, L, M, and N MUNI metro lines. Other transit enhancements to be prioritized by the Transportation Authority.

7. **Transit Maintenance and Rehabilitation:** Maintenance and rehabilitation of transit systems, including:
    - *Vehicles:* Rail car, trolley coach and motor coach renovation and replacement; retrofit of diesel coaches to reduce emissions.
    - *Infrastructure:* Replacement of and improvements to emergency lighting, ventilation, and automatic train control systems; seismic retrofit, and track, signal, and overhead wire replacement and rehabilitation.
    - *Facilities:* Maintenance and rehabilitation of existing facilities for maintenance and operations, including equipment. Maintenance, rehabilitation and/or replacement of facilities for administration.
8. **Paratransit.** Continued support for paratransit operations including phased replacement of accessible vehicles and related equipment.
9. **Streets and Traffic Safety.** In addition to the South Access replacement project (Doyle Drive) (described above), the Expenditure Plan would include funding for roadway improvements such as continued upgrading of Bernal Heights streets (grand-fathered project) and repair of erosion along the Great Highway (US1). Also included are San Francisco's share of projects identified in the San Francisco/San Mateo Bi-County Study:
    - Bernal Heights street system upgrades;
    - Great Highway erosion repair;
    - San Francisco share of San Francisco/San Mateo Bi-County Study projects such as the extension of Carroll Avenue to connect Third Street to Bayshore Boulevard, the extension of Geneva Avenue across US 101, and Candlestick Point improvements;
    - A widened and bicycle-friendly Illinois Bridge.
10. **System Operations and Efficiency.**
    - *New Signs and Signals:* Programmatic improvements including maintenance and upgrade of signs and signals. Maintain and implement transit priority systems on select corridors including bus priority lane markings. Installation of new traffic signs and signals to improve traffic safety. Both maintenance and new installations may include provision of pedestrian countdown signals at intersections. Also includes upkeep and new implementations of lane markings, channelization and red light camera enforcement. Relocation of traffic maintenance shop to a new location. Electronic meters including meters that accept credit or pre-paid debit cards.
    - *SF Go:* Programmatic improvements to manage roadway operations for transit, traffic, cyclists, and pedestrians. Includes citywide responsive and adaptive signal control that enables transit and emergency vehicle priority and detection of bicycle and pedestrian users. Interconnect and traffic signal controller technology to optimize vehicle flows. Closed circuit TV and communications systems for emergency system and general control.

- *Roadway Maintenance:* Programmatic improvements to provide for roadway maintenance needs, including repaving and reconstruction of City streets to prevent deterioration of the roadway system, based on an industry-standard pavement management system designed to inform cost effective roadway maintenance. Replace street repair and cleaning equipment according to industry-standards, to reduce maintenance costs and increase efficiency. Public sidewalk repair and reconstruction citywide. Additional pedestrian facility improvements including stairways, retaining walls, guardrails and rock-fall barriers. Upgrades of substandard bicycle lanes; rehabilitation of bicycle paths, and reconstruction of MUNI passenger boarding islands. Continued contribution toward ongoing operating and maintenance costs for the Embarcadero Roadway, through 2014.
- *Traffic Calming:* Improvements to neighborhood streets to make them more livable and safe to use for all users – pedestrians, cyclists, transit, and autos Includes strategies to reduce traffic speeds and improve pedestrian and bicyclist safety and circulation such as: improvements to bicycle and walking routes (e.g. sidewalk widening, streetscape upgrades including landscaping), speed humps, corner bulb-outs, chicanes and channelization. New or improved pedestrian safety measures such as ladder crosswalks and pedestrian countdown signals. Development of neighborhood and school area safety plans citywide, including above-mentioned strategies and outreach and education programs supported by state programs like "Safe Routes to Schools". Funds for new traffic circles, signals and signage including flashing beacons and vehicle speed radar signs.
- *Bicycle Circulation and Safety:* Programmatic improvements to the transportation system to enhance usability and safety for bicycles. Includes enhancements to BART and Caltrain station access (lockers, security, bike lanes), bicycle parking facilities, and safety improvements. Support for bicycle outreach and education programs. Funds infrastructure improvements such as the addition of bicycle and pedestrian facilities on local streets and bridges (e.g. at Indiana Street bridge and 18th and 20th street bridges over I-280).
- *Pedestrian Circulation and Safety:* Improvements to the safety and usability of city streets for pedestrians. This includes flashing pavement reflection on crosswalks, pedestrian islands in the medians of major thoroughfares, sidewalk bulb-outs, and improved pedestrian circulation around BART and Caltrain stations.
- *Curb Ramps:* Construction of new wheelchair curb ramps and related roadway work. Reconstruction of existing ramps.
- *Tree Planting:* Planting of new street trees and maintenance of new and existing trees in public rights-of-way throughout the city.

11. **Travel Demand Management**
    - *TDM/Parking Management:* Develop and support continued TDM and parking requirements for downtown buildings, special event sites, and schools and universities. Includes neighborhood parking management studies. Support related projects that can lead to reduction of single-occupant vehicle dependence including car sharing and updating/development of the citywide Bicycle Plan, Pedestrian Master Plan, and traffic circulation plans. Conduct transit service planning including a route restructuring study to optimize connectivity with BRT network and major transit

facilities (e.g. Transbay Terminal and Balboa Park BART station). Funds for study and projects to improve access of disadvantaged populations to jobs and key services

- *Transportation / Land Use Coordination:* Studies and ongoing planning for transit oriented development, support for neighborhood transportation planning, and funds to serve as local match for San Francisco and regional TLC/HIP programs that support transit oriented development and fund related improvements for transit, bicyclists, and pedestrians.

9. SURROUNDING LAND USES AND SETTING:

As shown in Figure 1 (previous), San Francisco is located at the northern end of the San Francisco Peninsula and forms the southern portion of the mouth to San Francisco Bay. The City and County's 46.7 square miles are bordered by the Pacific Ocean to the west, San Francisco Bay to the north and east, and the cities of Daly City and Brisbane to the south.

10. OTHER PUBLIC AGENCIES WHOSE APPROVAL IS REQUIRED:

The Metropolitan Transportation Commission, the regional transportation planning agency, is required to review the proposed Expenditure Plan to ensure that it is consistent with San Francisco County's priorities and commitments as adopted in the 2001 Regional Transportation Plan. Additionally, construction of transportation improvements may require approval of state, federal and responsible trustee agencies that may rely on this EIR for information relative to their areas of expertise. However, specific physical projects identified in the Expenditure Plan will be subject to subsequent individual environmental reviews, pursuant to CEQA.

ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED:

The environmental factors checked below would be potentially affected by this project, involving at least one impact that is a "Potentially Significant Impact". The EIR will include analysis of these environmental issue areas, as well as the mandatory analysis of growth inducing effects and cumulative impacts.

X Aesthetics
Agriculture Resources
X Air Quality
X Biological Resources
X Cultural Resources
X Geology /Soils
X Hazards / Hazardous Materials
X Hydrology / Water Quality
Land Use / Planning
Mineral Resources
X Noise
Population / Housing
Public Services
Recreation
X Transportation/Traffic
Utilities / Service Systems
X Mandatory Findings of Significance

DETERMINATION:

On the basis of this initial evaluation:

X I find that the proposed project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.

Tilly Chang, Manager of Planning — Date

José Luis Moscovich, Executive Director — Date

Appendix B: Comparison of Expenditure Plan and Alternatives

Comparison of Expenditure Plan and Alternatives

Category	*2025 No Project Alternative*	*Expenditure Plan*	*One Cent Sales Tax Alternative*
Modeled Changes			
Van Ness	The 47 Van Ness route was revised in 2001 (take some of the old 42 route)	Van Ness BRT -- Bus Rapid Transit from Van Ness' and Lombard to Market St; BRT includes an exclusive transit lane in each direction, with permanent stations, and signal preemption for transit vehicles. Existing owl service is retained.	Van Ness LRT - A new light rail route called the V was created. The V was assumed to run on Van Ness from North Point to Market Street where it would run above ground to Duboce and Church. There it would follow the alignment of the N-Judah to LaPlaya. The V was coded with the same stops as the Van Ness BRT plus several stops north of Lombard. West of Van Ness, the V line would share the stopping patterns of the F-Market and the N-Judah. It was assumed that the 47 Van Ness and the 49 Van Ness-Mission would be retained. They would not run in the exclusive lanes, but would benefit from other TPS measures.
Geary	(N/A)	Geary BRT -- Bus Rapid Transit from Geary's western terminus to Laguna St, and transit preferential street (TPS) treatment from Laguna to downtown. BRT includes an exclusive transit lane in each direction, with permanent stations, signal preemption for transit vehicles, and improved signage. TPS includes signal preemption and bus bulbouts, but does not take any lanes away from regular traffic. The 38 Geary bus would provide Owl service; at all other times the 38, 38L, 38AX, and 38BX are discontinued.	Geary LRT -- The Geary BRT "B" line is converted into a light rail line. It was assumed that the Geary LRT would enter a subway east of Laguna. The subway would travel under Geary to Union Square where it would hook up to the Central Subway. The Geary subway would branch off the Central Subway south of Market to end at the Transbay Terminal. Seven stops were included between Laguna and the Transbay Terminal. As with the BRT service, the 38 Geary bus would provide owl service.
Potrero		BRT along Potrero Ave between 15th and 25th Streets. Includes ridership from the 9 line.	(same)

Comparison of Expenditure Plan and Alternatives

Category	*2025 No Project Alternative*	*Expenditure Plan*	*One Cent Sales Tax Alternative*
Modeled Changes			
Geneva	(N/A)	Transit Preferential Streets (TPS) treatment to enhance bus travel time without removing a lane from general traffic. Geneva Avenue itself extended to Tunnel Road, see "Streets and Traffic Safety" below.	Geneva BRT - For the one-cent sales tax alternative, it was assumed that the BRT portion would be on Geneva from San Jose Avenue to Santos Street and would be served by the 9X San Bruno Express during the day, and by the 9 San Bruno during the evening. The 9 would be extended to City College in the evening. TPS improvements were assumed on the sections of Geneva not in the BRT corridor. The BRT service would require one travel lane in each direction. The travel time on the BRT segment was reduced to reflect the increased speeds. The headways of the 9X and the 9 (evening) were reduced to take into account the travel time savings from the BRT portion.
Transit Preferential Streets	(N/A)	Transit Preferential Streets (TPS) - a citywide network of preferred bus and rail service. TPS includes traffic signal preemption for transit vehicles, and real-time indicators for arrival information. TPS corridors include Mission, 19th Ave, Geneva, Folsom, and the J, K, L, M, N, and F Muni lines.	(same)
3rd Street	3rd Street LRT from Sunnydale Ave/Bayshore Blvd to Clay/Stockton. Includes New Central Subway and a route from Clay/Stockton to Mission Bay.	(same)	(same)
	Bus Lines 9AX San Bruno A Express, 9BX San Bruno B Express, 15 Third Street removed because of the Third Street Light Rail Line. 9x extended to Powell / Bay to replace north end of 15 line.	(same)	(same)
Caltrain DTX/Transbay	CalTrain Downtown Extension to the Transbay Terminal - All the CalTrain routes begin or end at the Transbay Terminal. Transbay Terminal rebuilt to enable planned express service expansion	(same)	Caltrain grade separation at 16th Street.

Comparison of Expenditure Plan and Alternatives

Category	*2025 No Project Alternative*	*Expenditure Plan*	*One Cent Sales Tax Alternative*
Modeled Changes			
CalTrain	CalTrain Express service between San Francisco and San Jose including electrification.	CalTrain Express service between San Francisco and San Jose. Additional speed and headway improvements as a result of Phase 2 "Baby Bullet" rapid rail plan.	(same)
	(N/A)	Relocation of Caltrain Paul Avenue station to Oakdale Avenue	(same)
	Capital Corridor service expansion	(same)	(same)
BART	Added 2nd entrance at Balboa Park Station		
	BART extension to San Francisco International Airport and Millbrae	(same)	(same)
	BART-Oakland International Airport Connector	(same)	(same)
	BART extension from Warm Springs to San Jose	(same)	(same)
Ferries	NOTE: 2025 No Project includes all projects modeled by Metropolitan Transportation Commission in the RTP runs.	Improvements to downtown ferry terminals. Included are additional intermodal connections, new ferry gates, improved emergency response, and landside improvements to serve increased ferry traffic. Ferry services to San Francisco were increased by reducing headways 20%.	(same)
Bus Route Extensions	22-Fillmore southern end was extended east from Sixteenth and Kansas Streets on Sixteenth Street to the Mission Bay Development	(same)	(same)
	30 Stockton and 45 Union-Stockton were extended at their southern ends, from 4th / King Streets to 3rd / 20th Streets (frequency was also changed as a result of Central Subway addition)	(same)	(same)
Bus Route Removals	The 42 Downtown Loop was removed (dropped between 2000 and 2001)	(same)	(same)
	The 83 Pacific was removed (dropped between 2000 and 2001)	(same)	(same)

Comparison of Expenditure Plan and Alternatives

Category	*2025 No Project Alternative*	*Expenditure Plan*	*One Cent Sales Tax Alternative*
Modeled Changes			
	The 80X Gateway Express, 81X CalTrain Express, and 82X Presidio and Wharf Express were removed because MUNI indicated they would be dropped sometime in the future	(same)	(same)
Historic Streetcars	Phase 1 of extension of service along waterfront, from Fisherman's Wharf to Fort Mason.	(same)	Historic Street Cars - The E line was extended to the Presidio through the Fort Mason Tunnel.
Muni Routes Additions and Changes	The 10 Townsend was added between 2000 and 2001 (follows some of the old 42 route)	(same)	The 10 was extended from 16th Street and Rhode Island to Connecticut and Cesar Chavez following the route of the 19 Polk. The travel time was extended to account for the lengthened route and was based on the speed of the 19 on that portion
	The 12 Folsom was modified in 2001. The route now travels on the Embarcadero	(same)	(same)
	The S Castro Shuttle (MUNI Metro) was added in 2001	(same)	(same)
		14-Mission and 14L extended to Daly City BART.	(same)
	(N/A)	(N/A)	6 Parnassus -- The southern end of the line was extended from 14th Avenue and Quintara along 14th Avenue and Ulloa to West Portal. The travel time was extended based on the speed on the 6 on the previous portion.
	(N/A)	(N/A)	24 Divisadero - The 24 was extended from 3rd Street and Palou Avenue to Hunter's Point Naval Shipyard. It was extended on Third to Evans Avenue where it follows the 19 Polk alignment to the shipyard site. The travel time was extended and was based on the speed of the 19 Polk

Comparison of Expenditure Plan and Alternatives

Category	*2025 No Project Alternative*	*Expenditure Plan*	*One Cent Sales Tax Alternative*
Modeled Changes			
	(N/A)	(N/A)	33 Stanyan - The 33 was extended to follow the alignment of the 48 Quintara-24th Street from Potrero and 24th Street to 20th Street and Illinois. The additional travel time was based on the travel time of the 48 on that segment
	(N/A)	(N/A)	41 Union and 45 Union-Stockton - These two lines were extended from Greenwich and Lyon to the Main Post area of the Presidio. The route of the extension was based on the alignment of the 82X Presidio and Wharves Express. The travel time on the new portion of the routes was based on the speed of the 41 and 45 on the previous portion of the route
Doyle Drive	The reconstruction of Doyle Drive (without changes)	Design will include an auxiliary lane providing direct access to the Presidio, facilitating bus movement from the South Access onto Richardson Boulevard or directly into the Presidio. Also includes a transit transfer center and connections to Marina Boulevard.	(same)
Roadway Changes	Central Freeway was removed north of Market Street	(same)	(same)
	The development of Octavia Boulevard on the right of way vacated by the Central Freeway was coded into the 2025 base	(same)	(same)
	Illinois Street Bridge was added over the Islais Creek Channel (Port of San Francisco has funding for the project)	(same)	(same)
	(N/A)	San Francisco share of San Francisco/San Mateo Bi-County Study projects such as the extension of Carroll Avenue to connect Third Street to Bayshore Boulevard, the extension of Geneva Avenue across US 101, and Candlestick Point improvements.	(same)

Comparison of Expenditure Plan and Alternatives

Category	*2025 No Project Alternative*	*Expenditure Plan*	*One Cent Sales Tax Alternative*
Modeled Changes			
Other Changes Outside San Francisco	NOTE: 2025 No Project includes all projects modeled by Metropolitan Transportation Commission in the RTP runs.	(same)	(same)
	Transit route changes between 2000 and 2001	(same)	(same)
	Rapid Bus Transit in San Pablo Avenue Corridor	(same)	(same)
	Vallejo intermodal ferry terminal	(same)	(same)
	Fourth bore for the Caldecott Tunnel	(same)	(same)
	Interchange modifications on Interstate 80	(same)	(same)
	HOV lanes added to Interstate 580 between Pleasanton and Livermore	(same)	(same)
	Roadway and freeway modifications in various locations	(same)	(same)
	Additional auxiliary lanes and passing lanes in various locations	(same)	(same)
	VTA light rail extensions in the Vasona and Capital Corridors	(N/A)	(N/A)

Source: San Francisco County Transportation Authority, May 2003.

2